1926.

QUEENSLAND.

TWENTY-SIXTH ANNUAL REPORT OF THE BUREAU OF SUGAR EXPERIMENT STATIONS.

REPORT OF THE DIRECTOR

TO

THE HON. THE SECRETARY FOR AGRICULTURE AND STOCK.

(*As required by "The Sugar Experiment Stations Act of* 1900").

PRESENTED TO PARLIAMENT BY COMMAND.

BRISBANE:
BY AUTHORITY: ANTHONY JAMES CUMMING, GOVERNMENT PRINTER.

A. 57—1926.

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DIRECTOR'S REPORT.

TO THE HONOURABLE THE SECRETARY FOR AGRICULTURE AND STOCK.

SIR,—I have the honour to submit the Twenty-sixth Annual Report of the Bureau of Sugar Experiment Stations up to the 15th November, 1926.

H. T. EASTERBY,

Brisbane, 1st December, 1926. Director.

1.—Introduction.

The record sugar crop for Queensland was produced last year (1925), when the yield of raw sugar of 94 net titre reached 485,585 tons, manufactured from 3,668,252 tons of cane. This tonnage of sugar was considerably in excess of the consumption of Australia, and in consequence 211,000 tons were exported at a loss to the sugar industry. The proportion that the sugar required for consumption and use in the Commonwealth of Australia bore to the total production of Queensland and New South Wales in 1925 was 56·021 per cent. The net value of the 94 net titre sugar sold abroad was £11 5s. 9d. per ton. The average price that the Queensland industry received for the whole crop was £19 10s. 7d. per ton of 94 net titre sugar.

This was a considerable reduction on the price obtained for sugar sold in Australia as the result of agreement between the Governments of the State of Queensland and the Commonwealth of Australia, which provides for a price of £27 per ton. Special concessions to consumers of sugar, and for administration and other costs of the Sugar Board, however, reduce the Australian price to £26. The pooling of the Australian price with the oversea value resulted in the price mentioned above, viz., £19 10s. 7d.

The agreement just referred to is now in its second year, and includes an embargo on the importation of sugar into Australia for a period of three years.

The question of the production of surplus sugar has caused a large amount of discussion during the past twelve months, and many schemes have been brought forward with the view of alleviating the trouble, including the allocation of quotas to the various mills. This matter is a complicated one and has been dealt with in the Report of the General Manager of Central Sugar Mills, while attention to it has also been given by the Central Cane Prices Board. The present season, however, will see a large reduction in the exportable surplus, and it is hoped that the difficulty will gradually be overcome. The principal cause for the surplus yields during the past three years has been the large increase in the area devoted to cane and in the number of cane-growers. In 1920 the area cultivated amounted to 162,619 acres, the number of cane-growers being 3,930, while in 1925 the area under cane was 269,509 acres (an increase of 106,890 acres or 65 per cent.), and the number of growers of 5 acres and over was 6,730, or 2,800 more than in 1920 (an increase of 70 per cent.).

The industry has been remarkably free from transport troubles so far this season, no railway or shipping disturbances having occurred to hold up the transport of sugar. Industrial disputes at the Mossman and Tully Mills, however, caused much loss of time.

The sugar produced in Queensland is handled by a Sugar Board, and their operations in finding markets involve much careful consideration and anxiety. Their work is recognised with satisfaction by the industry generally.

During the past year a Cane Growers' Council has been established by the Government to deal generally with the industry and look after its own affairs. The organisation consists of Mill Suppliers' Committees and District Cane Growers' Executives, while the Council comprises one representative elected by each of the district Cane Growers' Executives.

The largest sugar-mill in Australia has recently been erected and opened at the Tully, North Queensland. Already a flourishing township is in existence and a large population settled upon what was hitherto a dense jungle.

The utilisation of by-products of sugar-cane has moved a step forward in the erection of a distillation plant at the Plane Creek Mill, Mackay. The Queensland Government have afforded every encouragement towards the establishment of a power alcohol industry, and it is largely due to this that a new manufacture of paramount importance to Australia has been commenced on a promising scale. At the distillery at Plane Creek it is proposed to use molasses and cassava (a starch-bearing plant) for the purpose, and varieties of cassava of a high yield of starch were specially imported from Java by the Government. It is estimated that 1 ton of molasses will produce 65 gallons of power alcohol, and 1 ton of cassava roots is expected to yield 39 gallons. The Minister for Agriculture in Queensland, the Honourable W. Forgan Smith, recently said that "the matter

1. Introduction—*continued.*

of launching a power alcohol industry is one which concerns the whole of the Commonwealth, and is of particular interest to Queensland, in so far as it is highly probable that the raw materials suitable for power alcohol can be grown to greater advantage here than in any other State in the Commonwealth."

It may be pointed out that the production of molasses last year was 18,164,416 gallons, of which no less than 6,278,973 gallons were run to waste.

It is expected that the Plane Creek distillation plant will commence operations about March, 1927.

Another by-product, megasse, is also receiving attention, and the manufacture of building material from this source is highly probable.

This season has been considerably affected by dry weather conditions, particularly in those cane districts below Townsville. Frost has also done considerable damage on the Herbert River, Mackay, and many Southern areas. The crop for these reasons will not be nearly so large as in 1925, but this will mean a much better price for the cane-grower.

2.—Approximate Estimate of the 1926 Cane Crop.

The estimate of the cane to be crushed during the present season (shown in the second column of the table below) was supplied by the Queensland sugar-mills at the end of October, while in the first column is contained the approximate rough estimate formed earlier in the year.

Due to the nature of the present season, no cyclones or floods were experienced in the sugar districts. A good deal of damage, however, was caused by frosts in the Southern districts, also at Mackay, where frost was reported at Gargett, Owen's Creek, Silent Grove, Hatton, Netherdale, Rosella, Oakenden, and even further north at Bloomsbury, Proserpine, and the Herbert River. The dry weather has been particularly accentuated in the Bundaberg and Childers cane areas.

Estimated Crop of Cane, 1926 Season.

Mill.	Rough Preliminary Estimate formed in March.	Approximate Estimate Furnished by Mills at end of October.	Remarks.
	Tons.	Tons.	
Mossman	80,000	84,000	Increase due to September rains
Hambledon	185,000	190,000	ditto
Babinda	180,000	190,000	ditto
Mulgrave	185,000	185,000	
Goondi	160,000	164,500	ditto
South Johnstone	200,000	182,000	Part of crop being crushed by Tully Mill
Mourilyan	145,000	135,000	
Tully	125,000	140,000	Increase due to September rains.
Victoria	190,000	159,500	Reduction due to frosts and dry weather
Macknade	180,000	154,000	Reduction due to dry weather
Invicta	65,000	31,773	ditto
Pioneer	100,000	72,500	ditto
Kalamia	90,000	85,000	ditto
Inkerman	145,000	98,244	ditto
Proserpine	80,000	80,000	..
Cattle Creek	60,000	46,000	Reduction due to dry weather
Racecourse	100,000	82,000	ditto
Farleigh	120,000	70,000	ditto
North Eton	60,000	38,000	Including cane from Oakenden and Homebush
Marian	80,000	104,000	Inclusive of approximately 35,000 tons from Homebush area
Pleystowe	112,000	104,000	Reduction due to dry weather
Plane Creek	124,000	110,000	ditto
Qunaba	35,000	28,033	ditto
Millaquin	80,000	66,500	ditto
Bingera	90,000	69,000	ditto
Fairymead	90,000	73,500	ditto
Gin Gin	20,000	17,390	ditto
Childers	18,000	22,670	
Isis Central	25,000	27,600	
Maryborough	18,000	26,500	
Mount Bauple	35,000	34,500	
Moreton	70,000	63,000	Reduction due to dry weather
Eagleby	1,000	1,305	
Carbrook	800	600	
Alberton	1,000	1,115	
Rocky Point	16,000	8,000	
	3,265,800	2,945,230	

2. Approximate Estimate of the 1926 Cane Crop—*continued.*

Owing to the dry season the commercial cane sugar in the cane should be high, and indeed this has been so at most of the Northern mills. It should be safe to assume a yield of 1 ton of sugar at 94 net titre from 7½ tons of cane at most. If this is so, we may look for a production of about 390,000 tons of raw sugar of 94 net titre from Queensland.

In addition to this amount for Queensland it is anticipated that New South Wales will produce about 28,000 tons, while the yield of sugar (granulated white) at the beet sugar factory in Victoria was 2,315 tons. The approximate production for Australia should be some 420,000 tons, of which about 417,000 tons would be raw sugar. This would leave a surplus over Australian consumption of say 80,000 tons for export. These figures are approximate only.

While good rains fell from Mackay north during the month of September, 1926, which considerably enhanced the Northern crop of sugar, yet the rainfall for the year in every sugar district has been considerably below normal. It may be safely said that above the Herbert River droughts are unknown, and a dry season at places like Innisfail and Babinda is usually welcome, as better tonnages and more sugar per acre are produced than in exceptionally wet years when 200 inches or more have fallen. Even in this drought year over 85 inches of rainfall have been registered at the Tully and Innisfail for ten months of the year. Below Townsville, however, the rainfall has been very scanty, and crops have suffered accordingly. At the time of writing the drought has shown no signs of breaking, but as the rainfalls since 1921 have been below the average we are certainly warranted in expecting a return to good seasons.

COMPARATIVE PROGRESS OF THE INDUSTRY DURING THE PAST TWENTY-SEVEN YEARS.

The yield of cane per acre from 1918 to 1925 has been below the average for the previous decade, which is attributable to the number of dry seasons experienced. The yield of sugar per acre on the other hand is higher, and the number of tons of cane wanted to make 1 ton of raw sugar is much lower. The reasons for this are the improved efficiency of the sugar-mills, the work of the Cane Prices Board, and of the Bureau of Sugar Experiment Stations. The tables illustrating this phase of the industry are given hereunder:—

Table showing Yield of Cane and Sugar per Acre and Tons of Cane required to make One Ton of Sugar during Twenty-seven Years.

Year.	Tons Cane per Acre.	Tons Sugar per Acre.	Tons Cane to 1 Ton Sugar.
1899	14·81	1·55	9·54
1900	11·68	1·28	9·44
1901	15·10	1·55	9·76
1902	10·86	1·30	8·38
1903	13·65	1·52	8·97
1904	16·04	1·78	8·99
1905	14·73	1·59	9·27
1906	17·61	1·88	9·38
1907	17·64	2·00	8·84
1908	15·54	1·64	9·49
Ten Years' Average	14·76	1·60	9·20
1909	14·53	1·68	8·65
1910	19·45	2·23	8·73
1911	16·02	1·81	8·85
1912	12·72	1·45	8·79
1913	20·29	2·36	8·59
1914	17·80	2·09	8·51
1915	12·20	1·49	8·20
1916	20·81	2·33	8·93
1917	24·88	2·83	8·79
1918	15·01	1·70	8·82
Ten Years' Average	17·37	1·99	8·68
1919	14·83	1·91	7·76
1920	15·03	1·88	8·0
1921	18·60	2·30	8·11
1922	15·39	2·04	7·53
1923	14·75	1·94	7·60
1924	18·92	2·44	7·75
1925	19.36	2·56	7·55
Seven Years' Average	16·69	2·15	7·75

3. General Work of Bureau—Survey of Sugar Districts.

In the following table is shown the improvement in area and amounts of cane harvested and sugar made during the past twenty-seven years.

Table showing Total Acres Cultivated and Crushed and Total Yields of Cane and Sugar per Acre for a Period of Twenty-seven Years.

Year.	Acres Cultivated.	Acres Crushed.	Yield.	
			Tons Cane.	Tons Sugar.
1899	110,657	79,435	1,176,466	123,289
1900	108,535	72,651	848,328	92,554
1901	112,031	78,160	1,180,091	120,858
1902	85,838	59,102	641,927	76,626
1903	111,536	60,375	823,875	91,828
1904	120,317	82,741	1,326,989	147,688
1905	134,107	96,093	1,415,745	152,722
1906	133,284	98,194	1,728,780	184,377
1907	126,810	94,384	1,665,028	188,307
1908	123,902	92,219	1,433,315	151,098
1909	128,178	80,095	1,163,569	134,584
1910	141,779	94,641	1,840,447	210,756
1911	130,376	95,766	1,534,451	173,296
1912	141,652	78,142	994,212	113,060
1913	147,743	102,803	2,085,588	242,837
1914	161,195	108,013	1,922,633	225,847
1915	153,027	94,459	1,152,516	140,496
1916	167,221	75,914	1,579,514	176,973
1917	175,762	108,707	2,704,211	307,714
1918	160,534	111,572	1,674,829	189,978
1919	148,469	84,877	1,258,760	162,136
1920	162,619	89,142	1,339,455	167.401
1921	184,513	122,956	2,287,416	282,198
1922	202,303	140,850	2,167,990	287,785
1923	219,965	138,742	2,045,808	269,175
1924	253,519	167,649	3,171,341	409,136
1925	269,509	189,466	3,668,252	*485,585

* This is raw sugar of 94 net titre.

PROGRESS MADE IN THE DEVELOPMENT OF THE SUGAR INDUSTRY IN THOSE DISTRICTS SITUATE NORTH OF TOWNSVILLE, SINCE 1910.

The development of the sugar lands to the north of Townsville since 1910 has been one of the most remarkable facts of the sugar industry, and it may be asserted that in no other part of Australia have such rapid strides been made in an agricultural industry, while the increase in population since that year has been larger than in any other part of Queensland. To keep pace with this development, not only have three large modern mills been erected, but the mills previously in existence have been transformed into up-to-date plants capable of treating large tonnages of cane. It is of course recognised that these areas, with their high rainfalls and humid conditions, are naturally adapted to the best growth of sugar-cane.

The table following shows the progress made:—

Year.	Locality.	Number of Mills.	Tons of Sugar Produced.
1910	Above Townsville	7	57,135
	Below Townsville	42	153,621
1913	Above Townsville	7	62,414
	Below Townsville	41	180,423
1916	Above Townsville	9	98,396
	Below Townsville	38	78,577
1919	Above Townsville	9	101,351
	Below Townsville	33	60,785
1922	Above Townsville	9	120,617
	Below Townsville	31	167,618
1923	Above Townsville	9	161,227
	Below Townsville	29	107,948
1924	Above Townsville	9	189,947
	Below Townsville	29	219,189
1925	Above Townsville	10	216,755
	Below Townsville	27	268,830
1926	Above Townsville	10	226,000 (Estimate)
	Below Townsville	26	164,000 (Estimate)

3.—General Work of the Bureau, with Survey of the Various Sugar Districts.

This Bureau possesses Sugar Experiment Stations at Bundaberg, Mackay, and South Johnstone, with laboratories attached. These are known as the Southern, Central, and Northern Sugar Experiment Stations respectively. Entomological laboratories are established at Meringa near Cairns, and at Bundaberg.

3. Survey of Sugar Districts—*continued.*

In field work outside the Experiment Station the Director is assisted by three officers, viz., Messrs. J. C. Murray (Southern), E. H. Osborn (Central), and A. P. Gibson (Northern). The Southern district embraces from the Logan to Rockhampton, the Central from Rockhampton to Rollingstone, and the Northern from the Herbert River to Mossman.

These officers have carried out their duties to the entire satisfaction of the Director, to whom they afford much assistance in the survey of the various districts, the noting of conditions, pests, and diseases, and the affording of advice to beginners in cane cultivation.

During the past year Mr. N. L. Kelly has taken the place of Mr. W. Cottrell-Dormer (who is at present making further studies at the Queensland University) in the investigation of disease. Mr. Kelly has carried out his work with care, and has performed much useful work. The Director is also indebted to Mr. Dormer for advice on special matters that have been referred to him in connection with cane diseases. At the end of the present year (1926), Mr. Kelly will go back to the University, and Mr. Ferguson-Wood will join the staff permanently in connection with pathological work. Other students in pathology and entomology are being trained at the Queensland University, and by the end of 1927 the stations should have a fine scientific staff of earnest workers.

The Department of Agriculture, at the end of 1924, sent abroad three students, who were graduates of the Queensland University, to study different branches of the industry. One student (Mr. Norman Bennett) takes up sugar manufacturing problems; the second (Mr. A. F. Bell) will devote his time and attention to the study of plant pathology with special reference to cane diseases; and the third (Mr. H. W. Kerr) takes up the study of soil physics, chemistry, treatment, &c. At the end of their term of study it is proposed that they shall also join the staff of this Bureau.

In addition to the inspection of cane areas and the giving of advice to growers, the Field Assistants also supply the Bureau with observations on each farm visited. These notes are tabulated and sent in to the head office monthly, and include such subjects as the following:—Soils, crops, liming, green manuring, fertilising, drainage, irrigation, ploughing, planting, cultivation, harvesting, labour, trashing, ratooning, pests and diseases, varieties of cane in general use, climatic conditions, and arrowing of cane.

So far the Field Assistants have sent in reports upon 4,743 farms. Upon these 397 farmers have used lime, 886 have practised green manuring, and 1,099 have used fertilisers.

The percentage of farmers using green manures and fertilisers still remains very low. As pointed out in previous reports, growers for the most part have too much land under cane. It would be much more satisfactory to endeavour to raise bigger crops from smaller areas. The time is undoubtedly coming when we shall need more cane land to supply Australia's requirements, and this side of the question will then have to be considered. Up to the present land has been plentiful and comparatively easy to secure, but the tonnage of cane and sugar raised per acre is not what it should be, compared with other countries. An improvement can be effected by proper cultivation and fertilisation, and growers will thus be enabled to release some of their holdings to enable others desirous of growing cane to obtain land, and so make for the general prosperity of the country by adding to its population and resources.

The Director or his Field Assistants have during the past twelve months visited every sugar district in Queensland.

The time of the Director is largely taken up by the supervision and direction of the Experiment Stations, dealing with correspondence on sugar and cultivation questions, furnishing statistics of the industry, instructing growers and advising on the treatment of soils, and reporting on the sugar situation from time to time. Some 1,350 soils have now been analysed for sugar-growers, and a letter of advice accompanies each analysis made.

Annual Field Days were held at the different Sugar Experiment Stations during the year, and were very largely attended. The number present at Mackay constituted a record.

SURVEY OF DISTRICTS VISITED BY FIELD OFFICERS.

Mossman (One Mill).

The mill and its township are situated some four miles in a direct line from what is now left of the old but one-time important town of Port Douglas.

The sugar land is somewhat broken; it is purely coastal and is bounded on one side by a rugged, densely clothed, high range. The proximity of this to the sea generally insures a beneficial rainfall. The soil is mostly scrub or forest alluvial deposits. As a rule it is not deep; it varies in texture from light silt to a coarse decomposed granite.

Rainfall.—The annual rainfall is over 86 inches; last year the average was exceeded by fully 21 inches. This fine rainfall coupled with suitable humid conditions is most conducive to rapid crop growth, hence a satisfactory tonnage of cane having a good quality is raised. The four centres from which the factory receives its supply, with their respective areas harvested and tonnages last year, were as under:—

Centre.	Area Harvested.	Tons Crushed.
Mossman	2,421	39,658
Miallo	1,533	16,604
Mowbray	638	13,025
Cassowary	884	10,989
Total	5,476	80,276

These lands are scattered, necessitating the construction of many bridges and lengthy 2-ft. permanent tramlines, miles of which pass through great stretches of non-producing sugar land. Such districts require more rolling-stock,

3. Survey of Sugar Districts—*continued.*

greater supervision and maintenance, all of which naturally increases the cost of transportation and manufacture. The mill had its maiden run twenty-nine years ago. In the year 1906 it treated 103,291 tons—its greatest cane tonnage—and made 10,421 tons of sugar. Cane was then grown on the steep virgin hillsides. Now it is wholly confined to the lower levels.

Year.	Tons Cane per ton of Sugar.	C.C.S.	Extraction.	Tons Cane per hour.
1906	9·91	12·25	89·7	27·4
1925	7·64	14·20	94·7	32·1

Mossman is the only Northern mill that has not had a sufficient supply of cane. It is said the one remaining hope of insuring a profitable crop on the present face of things, and for which the management is striving, is the extending of the tramline some 13 miles to the Daintree River area.

Cane Varieties.—Many varieties are raised; the principal, with particulars, are as follow:—

Varieties of Cane.	Area under Crop.	Percentage.	Percentage C.C.S.
H.Q. 426 (Clark's Seedling)	1,241	22·66	14·84
Q. 813	45	·82	14·72
N.G. 15 (Badila)	1,125	20·55	14·66
M.Q. 1	98	1·79	14·60
B. 147	667	12·18	13·82
Goru	211	3·85	13·64
D. 1135	1,635	29·86	13·62
M. 189 (Black Innis) ..	85	1·55	13·31
Mixed	369	6·74	13·62

Others which are grown on a small scale show the following analyses:—Q. 903, 14·65 c.c.s.; H. 109, 14·40; E.K. 28, 14·15; and Q. 855, 13·66 c.c.s.

Q. 813 and E.K. 28.—The growing of these canes on the poorer soils should be extended; when grown on too fertile soil the former grows rapidly and lodges, resulting in a reduced c.c.s., higher harvesting rates, and light trucks. 7 R. 428 (Pompey) probably would do well on the poorer soils.

Fertilisers.—The value of the various manures purchased by the mill for the farmers last year was £17,087. This consisted principally of meatworks, mixed fertilisers, and sulphate of ammonia. The manure is applied at various rates per acre. Some prefer placing it in cane-drills at time of planting; others delay the operation until the cane is established. Surface dressings, unfortunately, are too often applied to grassy cane lands; in such instances the grass, not the cane, derives the benefit.

Green Manures.—These important aids to tillage are not used nearly so much as they should be.

Pests and Diseases.—Rats, grubs, wild pigs, and wire-worms have been responsible for great crop destruction. The banks of the many ever-flowing creeks and depressions intersecting the farms contain much undergrowth and prolific crops of panicum and other grasses, and are jumping-off places for the rat, besides protecting them from their natural enemies. The controlling of this dreaded pest is of immense importance. We can only hope to bring this about by the hearty co-operation of those concerned by—(1) Systematic poisoning; (2) clean farms, more especially headlands; (3) fencing out where possible the non-producing areas, thereby permitting the feeding of stock.

Cane-grubs.—Fully-grown Frenchi grubs had destroyed some 10 acres of D. 1135 plant cane on the Bri Bri Estate.

Wild Pigs raid the canefields in isolated patches and are quite capable of causing much damage in a short time.

Wire-worms are sometimes responsible for sets not germinating. Defoliated patches of cane were observed when passing through the Mowbray area by rail motor; this appeared to be the result of grasshoppers.

Small patches of *Aphis sacchari* and Sooty Fungus were seen. There is little cane-stem showing yet; in consequence borers were not noticed.

Disease.—Leaf Stripe (Downy Mildew) and Leaf Scald are widely distributed, more especially in ratoon paddocks having the varieties B. 147 and M.Q. 1. The more seriously affected fields should be ploughed out at the farmers' earliest convenience and subsequently limed. Unfortunately lime is scarce. Farmers are advised to watch plant crops closely and to remove affected diseased stools that may appear.

The harvesting of cane at Mossman was delayed for a considerable time by cane-cutters demanding green rates for burnt cane. The mill was to have commenced on the 11th June but did not make a start till the 5th August. The mill work has improved; in one week it crushed 5,053 tons, its greatest since its inception. The sugar is sent to Port Douglas over the Shire Council's small-gauge railroad, costing 14s. a ton, and removed to Cairns by some of the smaller freighters. It would perhaps be possible to raise the cane tonnage per acre of this district by the following methods:—

(1) More thorough cultivation prior to and after planting;

(2) Assisting to restore some of the apparent depleted soil humus by the growing and turning-in of green crops;

(3) Study more the varieties suitable for the many and various soils, and the eradication of diseases by judicious plant selection;

(4) Some areas appear rather big for the grower and weeds have over-mastered the crop. A small farm well and wisely tilled is more profitable than a neglected big one.

Cairns District (Two Mills).

Cane-growing is largely responsible for the great progress that has been made in this district during the past few years. Large cargo vessels call at the fine port of Cairns for the purpose of loading sugar, and hundreds of men find steady employment as a result of the mills' activities.

3. Survey of Sugar Districts—*continued.*

The crop this year will be larger than that of last season. The mills are working smoothly, and large tonnages are being dealt with, up to 7,000 per week. The commercial cane sugar is also high and the cane has weighed well, while crop prospects for next year are at present good.

The Hambledon Mill has considerably improved its tramway system to the Freshwater areas.

The Mulgrave Mill has also made many recent improvements, and has extended its tramways. The picturesque Little Mulgrave area has been connected by tram, and is now supplying a large quantity of cane.

The Mulgrave district tonnages and commercial cane sugar last year may prove interesting:—

District.	Tons.	C.C.S. Percentage.
Little Mulgrave and Pyramid ..	11,600	13·39
Riverstone	8,700	14·50
Meringa and Yatee	23,700	14·40
Highleigh	45,800	14·10
Over River and Aloomba ..	42,400	14·15
Behana to Fishery Creek ..	37,500	13·96
Eubenangee, Bellenden Ker, &c.	10,000	12·42
	179,700	14·00

Variety tonnage and c.c.s. average for season 1925:—

Variety.	Tons.	C.C.S. Percentage.	Crop Percentage.
N.G. 15 (Badila) ..	122,000	14·16	67·9
D. 1135	41,200	13·47	23·0
H.Q. 426	8,300	14·67	4·6
Other Varieties ..	8,200	13·67	4·5
	179,700	14·00	100·0

Improvements.—Extraordinary progress continues in Cairns and its surrounding areas. New and more modern buildings are being constructed. Extensive road improvements are under way; the use of motors is speeding up the necessary work. The town has been wisely planned and is destined to become one of magnitude and importance in the near future.

Babinda (One Mill).

This fine area of cane land has only been developed during quite recent years. The district extends all the way at variable distances back on either side of the North Coast railroad, from Fishery Creek to the southern banks of the picturesque Russell River. Throughout its area may be found mountains of great height and much land of high quality. Generally, the cane had a fine colour; the semi-dry conditions had slowed down the growth and enabled it to fully mature. The opinion is unanimous that never have such excellent sugar contents been known in the area. The crop is cutting out to expectations.

Planters are expecting a good price for 1927, and in consequence much land harvested this year has been ploughed out and immediately re-planted. There is not much Autumn plant. August is generally more seasonable, therefore most of the planting is done during that month.

Pests.—Cane grubs, weevil borer, wallabies, army worms, and white ants were noted. Grubs are sometimes credited with damaging cane when other causes have been responsible; however, grubs had occasioned damage to cane-growing on the Mirriwinni range-side friable decomposed granite areas. It is thought that beetles are gifted with a certain amount of homing instinct, or that the soil frequented carries an odour which the beetles on flight detect, hence the probable reason why they return to similar places. The weevil borer was found working strongly on several Babinda farms. Beetles were picked up along the line soon after a cane train had passed; evidently this is one of the many ways by which they are spread.

Grub damage, on the whole, has been light this season.

Babinda Mill has crushed 1,495,137 tons since its inception to 1925. Two hundred and fourteen growers supplied 164,238 tons of cane last year, while this season 190,000 tons are expected.

Area Harvested, 1925.	Cane Crushed.	Cane Condemned.	Yield per Acre.	Sugar per Acre.	Sugar Manufactured.
Acres.	Tons	Tons	Tons	Tons	Tons
8,769	164,238	694	18·7	2·5	22,430

The variety percentage of crop harvested, together with its respective average c.c.s., is as follows:—

Variety.	Per Cent. Total Crop	Average C.C.S.
Badila (N.G. 15)	90·56	14·098
Goru	3·88	13·878
H.Q. 426	2·48	14·166
D. 1135	1·04	13·615
Q. 813	·57	13·729
Other Varieties	1·47	14·053

It will be seen that H.Q. 426 variety, as in Mossman and Mulgrave, had yielded a higher c.c.s., but this is hardly a fair criterion to go by, because Badila is mainly grown, and, in consequence, is harvested early and late.

The railroad from Bucklands to what is known as 67-branch has been connected; this is a judicious move and one of double importance, for should one of the two bridges now spanning the Babinda Creek be damaged or carried away whilst crushing is in progress there would remain another avenue over which the crop could be removed to the factory.

Grubs are often credited with damage really caused by white ants. Beside devouring cane-sets they also tackle the old stubble of ratoons. The above-ground appearance resembles very much the grub symptoms. A mixture of molasses, caustic soda, and arsenic, in which small pieces of soft pine are soaked, and then buried shallow where the ants are, works wonders. If this pest is not checked it is highly possible that in time the sugar-cane may be found so succulent that the future young may be brought up on it alone.

3. Survey of Sugar Districts—*continued.*

Farmers continue to raise corn adjacent to their growing canefields. This plant is troubled with some similar diseases and pests, resembling Mosaic, Leaf Stripe, and even Leaf Scald. It is therefore quite feasible that the insects which frequent both crops may transport such infection from corn to cane. The sugar districts are lacking sufficient protection against the possible ignorant introduction of cane pests and diseases, mainly brought about by the interchange of plants between farmers. Manifestly, this assists greatly in spreading disease.

Waugh's Pocket.—This comparatively new area is situated some 9 miles south from Babinda, and drained by the Canal Creek, which empties itself into a great adjoining swamp. Five growers are producing cane, mostly of the N.G. 15 variety, and expect to cut about 5,000 tons for this season. The harvested cane is brought forward in trucks over a private railroad to the main North Coast line, and railed to the Mulgrave Mill.

The total crop crushed for the 1925 season at Cairns, including Babinda, was 531,789 tons, and the sugar manufactured, 72,680 tons.

Mill.	Tons Crushed.	Area Harvested.	Tons per Acre.
Babinda	164,238	8,818	18·6
Mulgrave	179,754	10,000	17·97
Hambledon	187,797	8,543	21·98
	531,789	27,361	19·8

Innisfail (Three Mills).

This wonderfully rich sugar-producing district commences some four miles back from the sea and is adjacently situated to the river Johnstone with its many tributaries, which serve to drain some of the excess water during the heavy tropical rainfalls it customarily receives. The soil is of two distinct types and compositions, namely—(1) Fertile alluvial deposits, often shallowing as it recedes from the river; and (2) undulating to hilly volcanic scrub red soil, possessing here and there outcrops of basaltic rock.

Cane culture has made remarkable progress since the year 1881, when its founder, Mr. T. H. Fitzgerald, first erected a mill and manufactured some 40 tons of sugar from 129,125 gallons of juice. The remains of the old factory may yet be seen on what is known as the Innisfail Estate. To-day there are three big mills—Goondi, Mourilyan, and South Johnstone—and the estimated tonnage to be crushed is some 480,000 tons.

The progress of the industry in this district may be judged by the growth of its dependent towns. Innisfail is rapidly covering more ground; streets and pavements have been improved, three reinforced concrete hotels under construction for many months are completed, and two more concrete bridges are under way—one replacing the old structure at Bamboo Creek, the other spanning the upper waters of the North Johnstone River at a point adjacent to the company's tramway bridge. When this latter is finished, the two cable ferries which have served as cross-over for many years will be abolished.

From the heights at early morn may be seen great trails of smoke, denoting the three busy mills' positions. The mills are working marvellously well on the 1926 crop, big weekly tonnages are being treated. It is indeed gratifying that the bulk of the cane being milled is unburned and clean; such improved conditions should be welcomed, for this is of untold benefit to planter and manufacturer. Last year the Innisfail district manufactured 64,299 tons of sugar.

Cultivation.—Some growers have reached an advanced stage of success, not because of working land of quality, but because they follow a judicious system of cultivation, coupled with the selection of vigorously growing and disease-free cane when planting; but other farmers are not so careful. Our sugar lands appear lacking in organic matter, therefore it seems imperative to conserve more trash and keep on growing leguminous crops. This is becoming more necessary as our lands become older and poorer. It is very poor agriculture to roughly plough a field just harvested twice and immediately replant; such improper method is most harmful to the soil. A disc harrow drawn across the stools after cutting often has beneficial results. Various causes are responsible for cane stools working to the surface; subsequent improved crops are made possible by throwing soil on to them.

Planting.—A large area had been and is being planted. That completed early has made slow progress, but has greatly improved since some rain of recent date. Placing full-length cane in drills and cutting into sets as it lies is often done. This should not be encouraged. Sets being used for planting, in some instances, were far from being perfect.

Manuring.—Mill compo and megasse ash had been distributed over resting areas. Various mixtures were being added to plant cane and the new ratoons.

Pests.—Grubs, weevil borers, and rats (to a lesser degree) have caused much destruction to this year's crop. The former pest has accounted for an estimated district loss of 18,000 tons. The weevil borer is working its hardest, being severe on individual farms. This pest is to be more dreaded than the cane-grub, therefore it is highly desirable that it be controlled prior to its becoming fully entrenched. A breeding tachinid fly cage has been established at the South Johnstone Sugar Experiment Station, and the farmers are proposing to erect others throughout the area. This should be good news to the grower, and may have the desired effect of arresting or wiping out what appears to be a serious pest.

Diseases.—Leaf Scald is prevalent in this district, but not to the same extent as farther north.

Varieties.—Many varieties are raised. The most favoured and profitable all-round cane is N.G. 15 (Badila); this should be grown on the good to medium soils, and 7 R. 428 (Pompey) and Q. 813 on the poorer soils. On the richer lands they should be classified among the disapproved varieties; here the growth is too rapid and the cane tumbles, resulting generally in a low commercial cane sugar content.

Isolated patches of cane, more particularly those growing on volcanic red soils, after harvesting, often develop yellow stripe in the leaf quite

3. Survey of Sugar Districts—*continued.*

distinct from mosaic disease. This may be due to the absence of chlorophyll, or perhaps to something harmful in the soil. Samples of the good and the bad soils were taken for the purpose of finding the reason, and what to apply.

Arrowing.—The season, the variety, and the time of planting mainly influence arrowing. The first indication of this was observed in the variety 7 R. 428 (Pompey), on the fifth day of April. Fully developed flowers were showing a month later on all varieties, but to a much less degree on N.G. 15 (Badila).

Leguminous Crops.—Mauritius beans and cowpea are mainly grown for the purpose of helping to restore the depleted soil humus. The former mentioned is a slower maturer, and is more difficult when old to plough under in the friable red soils. Rice beans—a recent introduction—have given promising results in the experiment stages. These and Mauritius beans were sown side by side in a small area, at the end of February, 1925, for comparison; the latter were completely destroyed during the prevailing wet conditions early in their growth, whilst the rice beans flourished and produced a satisfactory crop of green matter, maturing in June.

Action should be taken to stop people shooting the sugar farmer's friend, the ibis.

The country around Innisfail experienced remarkable rains in September—up to 18 inches having been registered in parts. This gave a great impetus to the young cane, which, on the whole, was looking exceptionally well and forward. The dry weather which has prevailed since then, however, has considerably dried up the grass, and further rains would now be welcome.

Banana-growing is increasing, and hopes are expressed that this industry will soon play a very important part in the further development of North Queensland, and prove of considerable benefit to the sugar industry by affording another use for scrub lands. Professor Goddard, who is taking a keen interest in this matter, is of opinion that the lands are eminently suitable for bananas, and that a great industry can be built up.

Tully (One Mill).

This mill had its initial crushing last year. As it did not commence crushing till November, 1925, the operations were more in the nature of a trial run.

Much settlement has taken place since the completion of Queensland's newest mill and the North Coast railroad to Cairns. What was an inaccessible, unpopulated belt two years back now carries an ever-increasing population which is speedily making roads and converting empty spaces to promising cane farms. Huge silky oaks, monarchs of the scrubs, were being cut for their valuable timber, and the dense tropical jungle is fast giving way to the ever-extending sugar areas. Cane-growing is a new venture for many here; some, in consequence, were paying dearly for their experience.

Scrub Felling and Burning.—A good fire improves the soil condition and considerably reduces subsequent logging costs. Various things influence this important operation, such as time of cutting and judicious felling—the complete severing of all trees from their respective stumps, otherwise they are slow in drying. Firing with the assistance of a gentle breeze during the heat of the day is preferable to night-burning.

Planting.—Planting the virgin scrub land was in progress. It is a common and good practice to make the cane-holes by spade, for which 4s. per 100 holes are paid.

Pests and Diseases.—Damaging cane-sets underground: (1) Termites (white ants), of which there appeared to be a small and a medium-sized ant. The damage would probably be reduced when the wet season sets in. (2) Minute, active, black beetles, found mostly boring through the nodes of plants. This seemed to be the softwood borer. Brown Rot was located on three farms, in N.G. 15 (Badila) on the virgin scrub land. The growth of the stools affected was quite equal to the surrounding ones, and the root system was considered normal, but dead and pulpy. When the stool is attacked it quickly dies.

Red Rot was located in canes being used for plants. Several fields previously planted from this area carried on the disease.

Some growers in ploughed areas were unwisely putting the fully grown canes into drills, and cutting same into plants as they lie. This is not plant selection, and the tendency is to extend pests and diseases.

The ratoons appear to be doing better than plant cane here; the probable reason is that the soil, since freed of its dense jungle, is gradually being sweetened by the process of aeration and direct sunlight.

Later in the season operations at this fine new mill have been considerably hampered by strikes, the mill supply being disorganised for over three weeks, due to cutters wanting green prices for burnt cane. This strike was apparently settled on 29th October, but it broke out again on 1st November, when it was again settled. This hold-up was most unfortunate for farmers who were just beginning cane-growing and who were looking forward to a good run this year to reimburse their expenditure. The mill was doing fine work, but much difficulty was found as the result of men drifting away during the interruption, which meant the training of another lot of inexperienced men.

The average rainfall at the Tully during the past eight years has been 142·04 inches, a little below that of Innisfail.

Planting.—The following notes on scrub planting may be of use to new growers, some of whom appear to have hazy ideas regarding this highly important work:—

1. When logging, clear 9 ft. tramway tracks every two chains.

2. Cane-holing. Of the many implements used, the spade is about the best. Make cane-drills 5 ft. apart and cane-holes from 2 ft. 9 in. to 3 ft. apart. Too close planting in virgin scrub land is not recommended.

3. Important—Use only disease-free and vigorously growing cane for plants. Keep knives sharp, and avoid too much immature top.

4. One good set in a hole is enough; cover plants with some two inches of pulverised soil

3. Survey of Sugar Districts—*continued.*

and do not entirely fill up the hole. This may be done later when the stool has become established. Given favourable conditions, the primary shoot should be bursting through the soil in about nine days.

5. Control the weeds on headlands and fields from the start. A poison solution sprayed on the early weed growth is cheap and effective, and is not harmful to the soil provided it is used in moderation.

Herbert River (Two Mills).

The township of Ingham, which is the capital of the Herbert River district, has improved rapidly recently. Four new and up-to-date concrete or brick hotels are being erected in the town area. Great improvements were also noticed in the roads, more especially in the one being constructed by the Main Roads Board to Halifax. At the latter place a traffic bridge is being built which will connect the North Coast line at Beamerside with Halifax direct, and which should greatly benefit Halifax.

Again, in Ingham the Colonial Sugar Refining Company are intending to remove their cane tram-line, that now runs down the centre of its two main streets, to a less conspicuous portion of the town. Upon the outskirts of Ingham, very many new and substantial residences are going up in places that were cattle paddocks only a very few years ago. All this prosperity is solely due to the sugar industry, and anyone conversant with Northern conditions must view with concern a curtailment of cane areas; more so when it is remembered that during the season of 1925 some 445,000 tons of cane (i.e., Macknade 230,000 tons, and Victoria 215,000 tons) were crushed.

This year, however, the output will not be nearly so large, due to the abnormal dry weather experienced up till September, when fine rains were experienced, but these rains were again followed by dry conditions. Unfortunately, severe frosts affected the cane during the winter, particularly the areas supplying Victoria Mill, where it was estimated that 1,500 acres were damaged. Frost of this nature is most unusual in the Herbert River district.

Arrowing seemed to be more prevalent than usual in nearly all the varieties, but exceptionally so in H.Q. 409. Regarding the young plant, some remarkably good strikes were seen, especially in ground that retained the moisture.

Cultivation.—A good deal of ploughing was being carried out, both by tractor and horse-power. Of the former there are many types in use, principally Fordson, Hart Parr, McCormack Deering, and Fiats. Probably due to such dry conditions, the land has had more work put into it than at any other time, the greater part of the soil being in really good tilth.

Varieties.—N.G. 15, Q. 813, N.G. 24, N.G. 24 B, H.Q. 409, Korpi, Nanemo, and Oramboo are the main canes grown upon the Herbert, and amongst these the proportion of Q. 813 for poor land has increased considerably of late years. Some splendid strikes of this cane were noticed, in one case upon a very dry and poor block of ground. H.Q. 409 is also grown to a large extent upon land considered too poor for N.G. 15, and some good crops were seen. Goru, where seen growing in sandy soil, looked extremely well for such a dry year. Good but patchy crops were also noticed of Korpi, Nanemo, and Oramboo. A few acres of B. 208 were seen growing at Helen's Hill, and these seemed free from disease, but the owner was warned not to let any of this cane go away to other farms for seed unless thoroughly examined by a competent person. It might be mentioned that this farm sends its crop to Giru.

Pests and Diseases.—Very little loss was noticed due to pests this year, an odd borer-infected stick only being seen. Grub damage was also very slight, whilst rats had been troublesome in only a few isolated areas.

Top Rot was noticed to be rather prevalent in plant Badila on a couple of farms in the Lower Stone River district. The owner of one of such farms was getting plants from an area in which Top Rot has not shown up so far.

Gumming.—This disease has not done much damage this season. Due to so much dry weather, it is probably hard to identify gumming in its earlier stages, but in its later stage it was seen in only a couple of places, one at Toobanna on the railway line, and in the other case near Gairloch, both cases in H.Q. 426 ratoons. It most certainly looks as if the prohibiting of this very susceptible variety by the company has given gumming a decided check. One bad practice is still being carried out by Italian growers, which is not calculated to make gumming detection easier, and that is the habit of planting the whole stick of cane in the drills and afterwards cutting up with a cane-knife, despite the many warnings that they have had against such methods. In connection with combating the spread of gumming, the company are propagating seedlings at their Macknade Nursery, to be grown afterwards near gum-infected cane, with a view to obtaining a variety that may be immune to the disease. This interesting work is under the supervision of Mr. K. Gard.

Implements.—Ploughing in trash is always strongly advised, and to expedite this operation the D.I. disc plough in use in Fiji for some time is now also to be seen in the Herbert River district, and is favourably reported upon, quite a number being in use. An Athens plough attached to a Fordson tractor was also doing very good work in breaking up a fairly solid and hard grass paddock.

Ingham Line.—The area between Rollingstone and Ingham supplies cane to the Invicta Mill at Giru. As regards the cane near the railway line, it was very patchy and a long way below last year's crop. Some 17,000 tons were expected from the 88 odd growers, but it did not seem likely that these earlier figures would be realised under such unfavourable growing conditions.

Another centre inspected was Toobanna. This is now a particularly busy station with a fleet of motor lorries handling the cane.

Giru (One Mill).

The mill at Giru is known as Invicta, and was the old Invicta Mill once working near Bundaberg. There is now quite a little township at Giru with two hotels. Last year 78,333 tons of cane were crushed, but the dry conditions prevailing this season lowered the amount to 31,733

3. Survey of Sugar Districts—*continued.*

tons. Drought conditions were very marked, more especially as Giru is not blessed with such a splendid underground water supply as Ayr and Home Hill. There are certainly several farms with a fine supply of open water to draw from, and where this has been taken full advantage of the cane has responded, but in nearly all cases the crops are a long way below last year's.

Very little planting had been possible, and although a good deal of ground was in the course of preparation yet the prospects for 1927 are anything but good.

Varieties.—The cane that shows up to greatest advantage during the present dry time is most certainly E.K. 28, and if it carries as good a density as it does in other places then its popularity is assured. In several places some young cane of this variety was seen growing and seemed to have struck well.

Diseases.—Mosaic was noticed in B. 208 first ratoons, and about a mile away from two farms on which it was noticed some eighteen months ago, also in B. 208. Now it is learned that all these plants came from the same place. This again shows the absolute necessity of careful seed selection.

Most of the cane supply for the Invicta Mill comes from the railway line between Townsville and Ingham.

Lower Burdekin District (Two Mills).

When this district was visited in July it was found to very dry, and the non-irrigated cane looked nearly as backward and dried up as it did in 1915. The irrigated cane was much better, but even this was not so far forward as was usual. Another noticeable feature was the small amount of young plant cane visible. Last year there were large areas of beautiful young cane to be seen. The amount of pumping done this year has been enormous, and the irrigation plants have been kept going almost continuously. A good deal of poor cane was being used as fodder for sheep which had been brought in from the West.

After the September rains the district looked green and healthy for a while, but shortly after commenced to dry up again. The total rainfall has been exceedingly low, and is made up as under:—

	Points.
January	142
February	811
March	162
April	nil
May	nil
June	13
July	nil
August	nil
September	466
October	nil
November	nil

This shows the important part that irrigation plays in this dry area, but cane-growing is costly under practically continuous waterings.

The two local mills were, as usual, very busy, Pioneer cutting out early in November, with Kalamia running another three weeks or so. Luckily, some good density returns were being obtained, Badila especially giving excellent results, even from several low-lying and rich soils carrying heavy tonnages per acre.

Throughout the area were seen some fine crops of early cane, planted with the aid of irrigation. As for the late-planted cane it was patchy, some good but quite a lot very backward.

As regards ratoons they were also patchy; one good block of some 30 acres (H.Q. 426, N.G. 24, B. 208) was promising with its well-stooled-out and even growth.

Everywhere the irrigation plants were in operation; steam plants, suction gas, and the ever-useful tractor being very much in evidence. When the large number of tractors is noticed, and the splendid work that they are doing in pumping and all sorts of cultivation work, it emphasises their immense usefulness to an area such as the Burdekin.

Cane Varieties.—Of the newer canes E.K. 28 is being planted out in a much larger degree than formerly, especially in medium to poor land. Local growers speak well of its striking qualities, rapid growth and erect form making it stand up well to irrigation, as well as its quick recovery after a check in growth, with a freedom from side-shoots when such a check occurs. One of the best results was obtained from an April planting of 11 acres, cut in July and August, and yielding 34 tons per acre for an average of 16·1 c.c.s. In the same area a 5-acre paddock cut 40 tons per acre in September for a c.c.s. of 16·0

A small area of Q. 813 was seen carrying good length and fair barrel, and will probably give about 35 tons per acre, but, as the adjoining land yielded a 51-ton per acre crop of Badila with a very high c.c.s., it is not likely to be grown in any quantity on such lands.

Q. 903 was also showing a nice sample of cane upon this farm, but seems rather erratic in density. On this particular farm, the owners are doing useful work in continually testing new varieties under local conditions and in quantities large enough to give average results.

Pests and Diseases.—White ants are still doing a great deal of damage to isolated farms, notably at Jarvisfield and Brandon. In both cases the pest seems to be going further afield, probably its damage being much helped by such dry times. At a Jarvisfield farm a small block of early plant Badila was so badly affected that six rows nearest the creek were absolutely eaten out, and further away through the remainder of the block many dead shoots were very evident. At Waterview, damage upon a larger scale had been inflicted despite poisoning with recommended mixtures.

Moth Borers.—Damage to odd shoots in many fields of young cane was observed, but upon investigating the shoots no trace of grub or caterpillar could be found.

Top Rot in the "red streak" stage was seen in a block of young Badila, upon an area where it usually is to be found to a certain extent. Many stools were showing the streak markings in leaves, but only odd shoots had died out. Growers here say that when the cane is attacked before "making cane," and at about October or November, only odd shoots suffer, but if the disease is seen after cane has been formed there is a certainty of greater losses.

3. Survey of Sugar Districts—*continued.*

The Kalamia Mill has recently added four crushing mills to its plant (5 ft. by 30 in.) to supplement the previous four sets of 4 ft. 6 in. by 30 in. These have been grooved according to latest practice. A new superheater and subsider have been installed, two new Babcock boilers have been erected, together with a new set of quadruple effets adding 7,500 square feet of heating surface, as well as new boiler feed pump, new condenser, and five new fugals. Six miles of 3 ft. 6 in. tram-line have been converted to 2 ft., and a 3 ft. 6 in. line for haulage of sugar, built from mill to North Coast Railway. A new spray system is being constructed for cooling, and a new chimney stack 100 ft. by 6 ft. 6 in. has also been built. A new sugar store has been erected of 3,500 tons capacity, and 200 new cane trucks provided. Altogether, over £100,000 has been spent in improvements during the past twelve months.

Home Hill (One Mill).

The township of Home Hill is increasing in population, and a number of new buildings have recently been erected. Good rains had also fallen here in September, after very dry weather, but the effect was not lasting.

The crops on the average appeared rather better than those upon the north side of the Burdekin, both up and down the river, but were beginning to want watering again, and in fact all the growers were then starting to irrigate. Rain was eagerly looked for, both for the crops and to fill up the waterholes as well as to ensure feed for stock.

The earlier planted young cane looked well, but inclined to be going back. Most of the recently planted cane will require very good conditions from now on to make a crop for 1927. The local mill (Inkerman) finished milling operations in November, after a rather satisfactory run to millers and growers, for although the individual grower did not harvest as much cane as last year yet a much better density and a slightly higher price for sugar made the average conditions better.

Concerning the Government irrigation system, it was pleasing to hear from nearly all the growers interviewed that the working conditions of same were now far more satisfactory than they had ever been; in fact, so much so, that several farmers who were not included in the system have applied for "power" at as early a date as possible, and expected to have same installed within a few weeks.

With reference to time lost through industrial trouble, &c., neither upon the southern side of the Burdekin nor upon the northern side had any serious delays occurred. In fact, a gang was seen at Jarvisfield cutting very twisted standover Badila, with a fair proportion of withered-up stalks yielding probably a 12-ton crop. The cutting was fair and all the damaged cane thrown out, and yet under Award rates, which speaks very well for the type of cutters employed and the good relations existing between employers and employees, incidentally also favouring the small-gang system.

Varieties.—The same varieties practically are grown upon the Home Hill area as upon the northern side. Some very fair results have been cut from E.K. 28 hereabouts, as the following figures reveal:—

	c.c.s.
11th September	16·1
18th September	16·1
25th September	16·4
2nd October	14·6
9th October	15·8
16th October	15·5

or practically 15·8 c.c.s. for a 40-ton crop on this class of country. The owners are so satisfied with these results that a further area has been planted out.

Proserpine (One Mill).

This district was also considerably affected by dry weather, and a large amount of cane was showing dry leaf. Frost also did some damage. When inspected in May last the following conditions prevailed:—

The cane in general was faring badly, and the estimate of 80,000 tons is a long way below last year's record crop of 104,000 tons. Practically no planting had been carried out, and nearly all ploughing had ceased, awaiting rain to moisten the baked soil. The general water supply was also very short as regards the house supplies, and farmers adjacent to the river mentioned that it had not run at all during the so-called wet season, and indications were that water for mill requirements would not be too plentiful. Despite such adverse conditions as compared with last year, it was pleasing to notice how the town was steadily increasing in size and importance, for several new shops had opened, and it was surprising to see the number of neat and well-kept cottages that have come into existence within the past couple of years; all emphasising the fact of the great importance that the sugar industry is to Australia in promoting settlement.

Cane varieties were represented in 1925 in the following proportions:—

Variety.	Percentage of crop.
Q. 813	24·0
N.G. 15 (Badila)	18·7
H.Q. 426 (Clark's Seedling)	17·5
M. 1900	13·7
Goru	5·3
Malagache	5·1
D. 1135	3·9
Striped Singapore	2·4
Mixed and other varieties, including Q. 1121, H.Q. 114, Q. 116, B. 147, E.K. 28, Innis, &c.	9·4
	100·0

Of the above canes, Q. 813 shows 2·8 per cent. increase and Badila 5·6 per cent. increase upon the previous year's figures, whilst H.Q. 426 shows a decrease of 3·5 per cent. upon same. The increase in N.G. 15 is mainly through the new outside area recently planted, but the increase in Q. 813 is on account of the satisfaction that it is giving as a good striker, quick grower, and good density cane at practically any period of the season.

The decrease of 3·5 per cent. in H.Q. 426 is on account of this cane being erratic to a certain extent and deteriorating in quality and growth.

M. 1900 was grown practically in the same proportion as the previous year, and gave very good returns.

3. Survey of Sugar Districts—*continued.*

Good rains fell in September which freshened up the cane. Great activity in cleaning farms and planting up was noticed. Tractors and horse-teams were busily engaged in getting land ready.

The mill was in full swing, and, having got rid of about 5,000 tons of burnt cane from Banana Pocket and a considerable quantity of badly frosted cane, was doing more satisfactory work, helped greatly by the new pan recently installed. The season will probably last until nearly Christmas.

Cultivation, &c.—As already mentioned nearly every grower was busy making the most of the favourable weather conditions, for, so far, only a medium acreage of early planting had been carried out. Various patches of such looked well. Several large blocks of Italian-owned cane showed that no pains had been spared to keep same clean; plenty of "hoe work" being evident. Q. 813 was being planted in most cases as most suitable for such late planting. Amongst individual growers visited, one Waterson grower was trying an experiment of using molasses as a fertiliser upon second ratoons, at about the rate of 2,000 gallons per acre, with untreated check-rows near-by. This same grower is also draining a low portion of his farm by using some 25 chains of tile 4-inch pipes. His experiments will be decidedly interesting in both cases.

Varieties.—Q. 813, M. 1900, D. 1135, H.Q. 426, N.G. 15, Goru, E.K. 28, Malagache, Q. 116, &c., are the principal varieties cropped. E.K. 28 is also receiving a good deal of attention. It might here be mentioned that so far Mackay experience of this variety indicates that it is most suitable to poor and medium soils.

Pests, &c.—Borers were doing a good deal of damage in N.G. 15 (Badila) in one or two parts of the area, and inquiries were made as to tachinid flies being liberated.

Wire Worms (so-called) are easily one of the major pests in this area, and are the direct cause of much loss to early planted cane. Grubs in the Kelsey Creek area were helped along by such dry conditions, and accounted for a good deal of damaged cane.

Disease.—Owing to such drastically dry conditions it was extremely hard to definitely locate any disease, but Red Rot was noticed in Malagache on a couple of farms in Cannon Valley, and in M. 1900 and H.Q. 426 elsewhere.

The fertile area at Banana Pocket has progressed wonderfully during the past four years, being now a very compact cane district. Quite lately a new school has been opened by the Education Department, and attached to the Post Office is a handy telephone system. A nice large recreation hall has been opened, and a number of large and comfortable dwelling-houses were seen upon several of the farms. Motor cars and trucks were much in evidence, and in general the "Pocket" presented a rather prosperous appearance.

Bloomsbury.—This centre has progressed rapidly within the past couple of years, and is now a settled cane area, with its rich alluvial flats capable of growing heavy crops of cane. N.G. 15, M. 1900, H.Q. 426, and Q. 813 are the principal canes grown, and give good results upon the rich or medium soils respectively. Some very fine crops of young cane (plant) were seen, and also some extremely good young ratoons. Unfortunately, this year's crop was rather below expectations, due to the dry times and also very heavy frosty conditions, said to be quite an exception in this area.

Insect pests and diseases were not conspicuous in this district.

Bowen.—Very little cane is now being grown at Bowen for the Proserpine Mill, the irrigation facilities being on too small a scale, and dry weather has seriously interfered with prospects. Practically no planting has been done for next year.

Mackay (Seven Mills).

This district was at one time the largest sugar-producing area of the State, but of late years its supremacy has been challenged. The crop this year, while good, will not be so large as in 1925, when the highest yield on record was made—viz., 89,706 tons of sugar. This season the output is expected to reach about 68,000 tons of sugar, which will be the second best on record. A great deal of the recent increase in tonnage, however, is due to the bringing in of new areas of cane lands, particularly to the north and south of Mackay, which were made available by the opening of the railway between Rockhampton and Townsville.

Frost was accountable for much damage to cane this year. Several areas were affected, more particularly Farleigh, Gargett, Owen's Creek, Racecourse, Silent Grove, Hatton, Netherdale, Rosella, and Oakenden. Such widespread frost is most unusual in Mackay.

The total rainfall at Mackay up to end of October this year was only some 26½ inches. No good wet season has been experienced since 1921. The average for the last five years has only been about 37 inches, in place of the average fall of 68 inches for a long period of years.

In speaking of cultivation to many growers, remarks were made by some that with sugar at such a low price they could not afford to cultivate as well as they wished. That is certainly so if a grower is trying to cultivate too large an area, but it cannot be denied that the small well-farmed area pays much better in proportion than the larger one yielding only a very medium crop, for in the latter case the savings in cultivation cost are exceeded by the extra cost of harvesting light and weedy cane, together with the loss of humus to the cane caused by the certainty of having to burn such crops.

Cane Varieties.—A large number of varieties are grown in the Mackay area, of which the principal are M. 1900, Q. 813, Malagache, D. 1135, Black Innis, H.Q. 426, N.G. 15 (Badila) Cheribon, 7 R. 428 (Pompey), E.K. 28, H.Q. 285, and several others in lesser quantities. Q. 813 and M. 1900 still continue to give great satisfaction as regards density; the latter unfortunately suffered from Red Rot last year to a certain extent. 7 R. 428 (Pompey) was looking very well in various parts of the district, and seems to be a cane capable of giving good tonnage and density in poor to medium ground, if cut

3. Survey of Sugar Districts—*continued.*

at the right time of the year. A plot of first ratoons of this cane gave a tonnage of 40 tons per acre and an average c.c.s. of 16.

Some splendidly vigorous-looking E.K. 28 was also noticed growing upon the Experiment Station at Mackay. In several parts of the district good plots of this cane were growing.

At the Plane Creek Mill the new Power Alcohol Distillery is well under way. Storage tanks to hold approximately a million and a-quarter gallons of molasses have been erected. The estimated cost of the distillery is about £35,000, and the factory will cover about 1½ acres. There are to be five open molasses vats and three closed vats for fermenting the cassava starch. Steam will be supplied by the Plane Creek Sugar Mill. It is proposed to use both mill molasses and the roots or tubers of the cassava plant in the manufacture of power alcohol. The latter plant was seen growing in various parts of the Plane Creek district and has made good progress. It is hoped that the distillery will be ready for work about March next, and operations will be watched with the utmost interest by all concerned in sugar-growing. Messrs. Barbat and Sons, of Ipswich, are erecting the plant. It is proposed to follow this by the erection of another plant to treat molasses, in the Cairns district.

The Plane Creek Mill had crushed 86,200 tons of cane up to the 14th November, at the rate of about 5,400 tons a week. A new 6-ft. by 35-in. crushing mill is to be installed next season. This will much improve the extraction. A very fine solid weir has been erected across Plane Creek, by which 20,000,000 gallons of water are held, which will ensure a remarkably fine supply of water for milling and distillation plants.

During the last few months the Marian Mill at Mackay has made extensive additions and alterations to its plant. These include a new steel building for the crushing-house and three new mills 6 ft. by 35 in. with independent drives. The mills were made by Fletcher and Company, of Great Britain. A new 20-ton Calandria pan with 1,800 sq. ft. of heating surface has been installed. This is 12 ft. in diameter. The syrup capacity has been increased by 7,000 gallons. The mill now contemplates further improvements in the shape of a quadruple effêt, new chimney stack of steel, 100 ft. high by 8 ft. in diameter, fan and engine for induced draught, one 15-ft. subsider, new fugals, large fugal engine, Thomson Wolverhampton boiler of 6,050 ft. heating surface, which will make 25,000 in all. This mill at present is putting through over 5,000 tons weekly, the average commercial cane-sugar in the cane being 13·75 per cent.

The Farleigh Mill, which was taken over by the farmers from a private company this year, was reported to be doing good work, between 4,000 and 5,000 tons of cane being put through weekly. This mill did not commence crushing till 8th September, following a very complete overhaul. The commercial cane sugar in the cane, the extraction and efficiency, have all been good. Owing to the large crop a good deal of the Homebush cane was being sent to Marian and other mills. This mill expects to finish early in January, 1927.

Good rains fell in September which materially helped the cane along for the time being, but a month later the area was exceedingly dry again; the rich green appearance of the grass had been lost, and the country was rapidly assuming a dry, brown look. The young cane, however, on well-cultivated land looked well, and the plantings for next year had been good. The total mill estimate had been slightly reduced, and it was anticipated that the total production for the Mackay district would be 69,000 tons of raw sugar, in place of 73,000 tons estimated in July.

Bundaberg (Five Mills).

This district suffered considerably from dry conditions this year, and all mills had to reduce their estimates considerably. The season closed comparatively early. Gum is still prevalent in cane in this district, but is not considered so bad as it was last year. Mosaic is also frequently seen. Cultivation at Bundaberg as a whole is good, especially on the red soils. Frost caused some damage this year; practically all the canes in the belt that stretches from Lovers' Walk through to Spring Hill were affected. The D. 1135 probably suffered the worst. M. 1900 Seedling showed a certain degree of resistance, also Q. 813, H. 227, E.K. 28, and Q. 970. Taking the severity of the frost into consideration, however, it is surprising that more damage was not done, especially as the cane was backward and lacked vitality. On the river no noticeable damage occurred from frost. A fungus, perhaps induced by the severity of the winter, was heavily attacking the cane in places. It resembled the well-known "cane soot" of sugar-cane.

The appearance of the district at time of writing is very parched. Little grass is to be seen, cattle are poor, and waterholes dried up. It is to be hoped that good rains will shortly fall. The young ratoon cane so far is looking fairly well, but early planted cane is suffering.

Childers District (Two Mills).

This area was more affected by dry weather than Bundaberg, and early in the year a good deal of cane was dying down. The resulting crops for the mills were poor—much less than a half-crop. A large proportion of the crop is M. 1900 Seedling.

Owing to the long spell of dry weather, no definite information could be obtained as to fertiliser results. Farmers who have green-manured their land have noticed the cane has fared better thereon under the dry conditions than on the unmanured land. Analyses of soils from Childers which have been manured with legumes show the soil to have a very fair total nitrogen and humus content.

Regarding cane diseases, Mosaic was showing fairly freely. There is also a considerable incidence of Foot Rot. This disease appears to be spreading, and growers who have it in their fields should, when they cut this crop, plough out and give the land a lengthy fallow. The rotary cultivator should not be used where this disease occurs, but the stools should be taken out and burnt. No plants should be taken from an infested area.

Referring to Mosaic and its eradication, farmers want to bear in mind that maize and cane are not the only hosts that suffer from

3. Survey of Sugar Districts—*continued.*

Mosaic. Sorghum and some grasses are host plants, and Johnston grass also suffers from what appears to be Mosaic disease. In regard to Corn Mosaic, this frequently produces markings on the stalk similar to that produced by the Cane Mosaic. Both diseases cause shrivelling of the stalk.

At Booyal, which supplies cane to the Isis Central Mill, there are no tramlines, consequently the handling has to be done by horse-teams and motor lorries. This is a hot, dusty job, and no doubt man and beast are pleased when it is finished.

The farmers have established a variety plot at the school, under the supervision of Mr. Bates, the teacher. This is a step in the right direction, and is a matter that could be profitably taken up by other districts.

Regarding cane maladies, Mosaic disease is showing with a certain degree of frequency.

Dallarnil, which also supplies the Isis Central Mill, has suffered a great deal from the dry weather. A considerable amount of effort has been put forth by the growers, and it is unfortunate that they should have encountered such a dry spell this year. However, if they do not take a heavy tonnage off there should be a heavy crop for the following season.

Farmers here, during the next planting period, are recommended to be careful in plant selection and not use disease-affected sets.

Maryborough (One Mill).

The continued dry weather has had a serious effect on the cane in this district, especially on that land which forms the more elevated farms. The flats along the Mary River are showing fair cane, this being no doubt due to moisture-conserving properties, through having greater capillary action and more humus than the higher lands.

With reference to the red volcanic soils that occur in the Maryborough district, these should give better results than the farmers obtain from them. There are some rich red soil areas between Maryborough and Magnolia, and if the farmers working them would give exclusive attention to 30 acres each they should do well. One man by himself cannot do justice to more than 20 acres of cultivation—that is, if he does it properly. In farming 30 acres, the grower could aim to have 10 acres always undergoing rotation, fallowing, green manuring, or other treatment conducive to the restoring of the soil. Ploughing and planting a farm are the least exacting of the operations involved, the subsequent cultivation requiring many months of careful and constant work. The lack of this is the great weakness in Queensland cane farming generally.

Regarding varieties for the Maryborough district, the growers are recommended to discard Meerah, Striped Singapore, and Rappoe. The best varieties for this district are M. 1900 Seedling, H.Q. 285, E.K. 28, and Q. 813. The canes recommended to be discarded are very susceptible to disease, particularly gumming. Samples of typical soils were taken for analyses.

Pialba.—This district sends its cane to Maryborough and other adjacent mills. Here there is some very fair cane to be seen, particularly the Q. 813. This variety is gaining in popularity. The Hambledon Seedling 285 is also being more accepted. The district generally is making good progress, and, although the dry spell has hit the farmers this year, Pialba may become one of our most important rural centres, though cane will probably be the staple product. A good road is badly wanted from Maryborough.

Regarding improved methods of cultivation in the Pialba district it was noticed that the tractor is coming into prominence. The rotary cultivator is being used also, and it is the consensus of opinion among cane-growers that this is the best implement they have had for some time.

There is a general improvement taking place in the farming standards of this district. That most important phase of cane-farming. leguminous crop planting for green manures, is getting considerable attention.

Yerra also supplies cane to Maryborough and other mills. The farmers here were busy with the cutting at the time of visiting. The cane on the whole appeared to be satisfactory, considering the long spell of dry weather that it has been through. The farmers have been experiencing a particularly dry time here, there being practically no water in the creeks or holes. The pasture is dry, although stock were in fair condition.

Mount Bauple (One Mill).

A fair crop will come from the Bauple district this year. The district generally has a more prosperous appearance than hitherto, the extension of fruit-growing and road construction helping to create this impression. There should be a big future ahead of this district in relation to citrus fruits and bananas, the fine easterly aspect of the jungle-clad hill-slopes being particularly favourable for this product. Oranges, too, present a beautiful sight almost anywhere they are grown.

The three varieties showing well in the Bauple areas are E.K. 28, Q. 813, and H.Q. 285. Growers are recommended not to plant areas that are unwieldy on account of their size, but to farm efficiently on lands within their financial resources. Sugar-farming is now a highly specialised industry with good rewards for those who treat it as such, but with small results for those who do not. A farm of moderate size adequately drained, tilled, and fertilised will produce more than a much larger area indifferently farmed. Also, to make a success of a farm it must be treated as a life work, not as a "get rich quick" process.

There is still a little Mosaic in the Bauple district.

Mary Valley.—There is very little cane-growing in this district at present, the farmers not generally considering it a paying proposition, from a commercial point of view. Splendid crops can be grown here, but distance from mill and other facts are proving too much for the farmers. However, they are in the fortunate position of not being dependent on sugar-cane for a livelihood.

Cooroy.—At one time quite a lot of cane was grown in this district, but at present the farmers find other pursuits more profitable. Only very

small areas are now in existence. The standing crops, however, look well, and if the farmers continue to plant they could profitably use more M. 1900 Seedling. This cane has a peculiar liking for high, well-drained, volcanic soils, and is a profitable variety when it can be grown.

Moreton District (One Mill).

Extensive alterations are being made at the Moreton Mill, Nambour. The building has been reconstructed to provide for additional machinery. Three new 6 ft. by 35 in. mills, manufactured by Duncan Stewart, have been installed, together with a new shredder. Ten thousand square feet of additional heating surface are being provided, and a new large Calandria pan 11 ft. in diameter. An extra four crystallisers and eight more centrifugals have been erected, as well as a new Thompson multitubular boiler. The whole of the factory has been remodelled, and the yards outside rearranged and enlarged, while 300 new cane-trucks have been provided. These alterations will amply ensure that all the cane grown during the next few years will be treated without difficulty, and there should be no need for the mill to start before the cane is at its best. The estimated cost of the new plant is about £110,000.

The disease known as gumming has been severe in this district, and, in order to endeavour to provide gum-free plants in the area, farmers were proposing to establish an isolation farm at Kureelpa on the range, for the purpose of growing resistant varieties. This, if carefully carried out, should be of much value.

In relation to varieties, Q. 813 is now the most favoured. H.Q. 285 is also a cane showing well at the present time. H. 227 is being gradually extended and is looking promising. There are a great many varieties other than these in the district, but the three mentioned are the most promising from the growers' point of view.

Regarding incidental crops, farmers are advised to keep maize well away from their cane. Cane adjoining maize appears almost invariably to become rapidly affected with Mozaic.

Coolum Areas.—The seasonal conditions have been favourable for growth. It would not be too much to say that the growers here have the best cane in the Southern district this year. The Q. 813 has made extraordinary growth; the N.G. 15 has also done well; Q. 970 is making a good showing. The growers are gradually overcoming the drainage difficulties, and the various holdings are assuming a workmanlike appearance. So far there has been no great amount of fertilising carried out here, but as time goes on the growers are recommended to experiment, with the object of obtaining definite data on this important subject. There is abundant humus in these soils, but humus alone is not sufficient.

Maroochy River.—There are some good crops of cane in this area. The Q. 813 has made the best showing, in fact when this variety is planted the chances of getting a good harvest are excellent. Growers are recommended not to cut this cane too early in the season. If they do a shy ratoon is to be expected. Wait, if possible, until after the middle of September.

In relation to disease there is a popular idea that Q. 813 is resistant to Mosaic disease. On the contrary, while Mosaic is not frequently seen in Q. 813, it is most susceptible to injury. On this account this disease is very readily recognised in this variety. The important thing is to get rid of Mosaic altogether, and owing to its remarkable effect on Q. 813 its recognition and consequent elimination are comparatively easy. Other varieties of cane doing well are H. 227 and Pompey.

Beenleigh District (Four Mills).

The farmers in this fertile district did fairly well with their cane last year. One noticeable feature was the number of farmers who are planting the variety Q. 813. The bulk of the growers supplying Mr. Heck's mill of Rocky Point are now planting this cane. It is not only high in sugar, but shows considerable disease resistance. Some farmers have small areas of H.Q. 285. Other local names for this valuable cane are "Early Maturing," "Nerang," and "Milton's."

Regarding pests and diseases, no serious losses were reported by the growers from these, but an infection that may prove serious, if not watched, was located. The following is a description:—The diseased shoots will grow a foot or so and will have a number of healthy-looking leaves when suddenly they will lose their capacity to grow normal leaves and throw out a few bent and twisted ones. Some of the eyes may shoot, but they soon become twisted like those on the main stem. An examination of the leaves will show a number of long galls on the underneath side of the leaf. On splitting the cane small galls can be found on the vascular bundles. Practically all the leaves bear these galls.

The farmers are recommended to plough out and burn the affected stools and get plants from an absolutely unaffected area. No time should be lost in destroying affected stools. This disease has since been identified as the "Fiji disease" of sugar-cane, and steps have been taken to endeavour to prevent its spreading.

4.—Work of the Division of Entomology.

The Entomological Laboratories of this Bureau are at Meringa, near Cairns, and at Bundaberg. The former situation for the chief office was chosen as being near the centre of the worst cane-grub infestation in Queensland.

Mr. Edmund Jarvis is the Entomologist in charge of Meringa, whose work is of high standing and largely appreciated, both in Queensland and abroad.

Mr. Jarvis is assisted at Meringa by Mr. A. N. Burns, Assistant Entomologist, of whose work Mr. Jarvis speaks with much praise, and by Messrs. Bates and Buzacott, Assistants to Entomologist, who have also carried out their duties in a satisfactory manner, and rendered much help to farmers and the Bureau.

4. Division of Entomology—*continued.*

Annual Report of Entomologist, 1925-26.

The following is the report of the Entomologist at Meringa for the past twelve months:—

To the Director,

Bureau of Sugar Experiment Stations.

Sir,—I have the honour to submit the following report of the work of Meringa Experiment Station during a period of twelve months ending August, 1926.

Since the publication of my last Annual Report we have experienced drought conditions, which have to some extent interfered with field experiments.

Instead of the average yearly rainfall of about 90 inches, our record at Meringa Laboratory during these twelve months was only 41·23 inches.

Such climatic conditions, however, although hindering cultivation and normal growth of the cane, have exercised at the same time a very desirable check to the increase of the beetle pest, thus affording no slight compensation to those growers who have the misfortune to suffer very materially each season from the ravages of cane-grubs.

During the past season our principal cane-beetle, *Lepidoderma albohirtum* Waterh., again received a decided setback, before able to rally from a previous severe check sustained during the three years 1922 to 1924.

Climatological Control of Grey-Back Cockchafer.

It is very interesting to trace the manner in which this exceedingly valuable repression of so formidable a pest has been at present accomplished by the simple operation of natural factors of a meteorological character.

Such climatic control usually results from prolonged drought conditions, the degree of efficiency attained being, in the case of our cane-beetle, dependent upon the time of year and duration of the period over which such influence is exercised.

Apparently, the most important phase in the life-cycle of this insect, viewed from an economic standpoint, is that of its pupal condition, which happens to be passed underground in an oval chamber formed by the grub at depths varying from 6 to 15 in. or more.

Although occupying a position so well calculated to exclude possibility of attack from predaceous insect or other enemies, these cockchafers, after transformation to the imago state about six weeks later, unfortunately find themselves practically imprisoned in their subterranean cells, from which escape is impossible until the surrounding hard dry soil shall have become sufficiently softened by heavy rain to allow them to tunnel upwards and reach the surface.

"Ages untold
Have watched thy countless hosts awake each Spring,
Crawl from the steaming earth and take to wing."

Now, it is all-important that, just before and for some time after pupation of the grubs in June or July, the rainfall should continue normal throughout a period of five months (June to October) in order that such transformation may take place at the proper depth, and the soil remain moist until commencement of the flighting season.

Should abnormally dry conditions prevail during these months, coupled with a precipitation far below the average throughout the preceding period of January to May, a check to the activities of this species must assuredly follow.

In event, however, of such climatic conditions being continued through November and December, the check sustained is generally of great severity, and enormous numbers of these beetles must inevitably perish hopelessly in their underground pupal chambers.

Glancing back a few years we find that the last decided outbreak of this pest occurred in 1921, when the rainfall was 124·50 inches, being 34·50 inches above the average.

This gave the enemy a chance to recover from slight climatological checks experienced during 1918 to 1920; and had the precipitation in 1922 been normal they might have again appeared in sufficient force to occasion very serious damage.

Fortunately, the rainfall in 1922 happened to be 25·30 inches below the average, and instead of getting 9·87 inches during the critical period of June to October we recorded 7·52 inches. Such adverse conditions would alone have served to curtail the increase of this cockchafer; but being followed, as they were, by an exceptionally dry November and December, in which the rainfall was 10·85 inches below the average for these two months, the result was an additional setback of unusual severity.

In the year 1923 this species again received a blow, which, falling on top of that experienced the preceding season (1922), reduced its numbers to comparatively harmless proportions; these desirable conditions having resulted from the rainfall chancing to be 47·19 inches below the annual average, while the amount registered for the critical period of June to October was only 275 points, as against 9·87 inches, the usual average for these five months.

Although 1924 favoured the increase of *albohirtum*—the rainfall throughout June to October being only 1·65 inches less than the average—its feeble attempts to regain ground were again doomed to defeat the following year (1925), when the annual precipitation fell again to 21·67 inches below normal, and instead of recording 9·87 inches during June to October the rainfall at Meringa for this period was 4·99 inches. To make matters worse for this pest, the fall during November and December collectively happened to be 6·94 inches below the average.

The table given below indicates clearly the intensity of the various successive checks received by this cane-beetle during the last four years. The most significant rainfalls are printed in

4. Division of Entomology—*continued.*

italics, since these were chiefly instrumental in bringing about its control.

	Annual Rainfall at Meringa.		Number of Inches June to October.		Number of Inches Nov. and December.		Rainfall during period 1921 to 1925 if Average had fallen. Inches.	Decrease in Rainfall for 1921 to 1925. Inches.
	Number of Inches recorded at Meringa Lab.	Number of Inches below Average Rainfall.	Rainfall at Meringa Laboratory June to Oct.	Number of Inches below average June to Oct.	Rainfall at Meringa Laboratory. Nov. and Dec.	Number of Inches below average Nov. and Dec.		
1921	124·50	..	19·91	..	13·06	..		
1922	*64·70*	25·30	7·52	2·35	*2·70*	..		
1923	*42·81*	47·19	*2·75*	7·12	6·63	6·29	457·50	83·47
1924	73·69	16·31	8·22	1.65	17·56	..		
1925	68·33	21·67	*4·99*	4·88	*5·98*	6·94		
	374·03	..	..	..	45·30			

With reference to the rainfall during January to August of 1926, and the possibility of its affecting the numerical increase of this species, it is interesting to record that during this period of five months we have received 40 inches, which is 32·58 inches below the average.

Economic Position of Artificial Control.

During a period of seven months, whilst away in Victoria on extended leave of absence, the work of this Experiment Station was carried on conjointly by the Assistant Entomologists, Messrs. A. N. Burns and R. W. Mungomery.

Owing to drought conditions and other factors, our results from some of the experiment plots laid down by them at Meringa on high land of a volcanic nature were rendered inconclusive, and will need to be repeated during the coming 1926 to 1927 season.

The plots in question were those treated with fumigants known under the trade names of "See Kay," "Chlorocide," and "Cyanogas"; all of which appear well deserving of further trial against grubs of our cane-beetles.

Paradichlor. again proved the most effective of any of the insecticides submitted to field tests, and this despite such adverse factors as—(1) poor cultivation, (2) the presence of big weeds, (3) a light friable soil, (4) grub injury to the previous season's plant crop, and (5) prolonged drought conditions from 1st February to 30th June; the rainfall during these five months, dating from application of the paradichlor., being 35·26 inches below the average for that period.

Whilst in Victoria recently I visited various chemical factories, &c., and obtained several samples of by-products of an insecticidal nature, for trial against cane-grubs.

Some of these have given encouraging results in our laboratory, and appear deserving of further tests under field conditions.

A few additional patent insecticides have also been forwarded to this Experiment Station from Brisbane and elsewhere during the last twelve months.

Such outside activity indicates, as mentioned in my last Annual Report, a fuller realisation in some quarters of the economic significance of entomological research work.

At the present stage of the cane-grub problem, however, it seems to me that, instead of endeavouring to find new remedies, it would be better to concentrate experimentation for the most part on the discovery of cheaper and more practical methods of applying such insecticides as have already been found to be thoroughly effective against grubs of this pest.

In these days, when the control of insect pests by means of introduced predaceous and parasitic enemies plays so important a part in the field of economic entomology, and has in some cases proved of such inestimable value, one is apt to regard other and less fascinating remedial methods as somewhat irksome and commonplace by comparison. Growers would do well to remember that these latter forms of control are likely to continue to hold first place in the work of combating most of our insect pests, seeing that the results obtainable by the use, for example, of such artificial remedies as poison-baits against "army worms," grasshoppers, &c., or of arsenical and other sprays for coping with plant-eating beetles, may generally be depended upon to yield beneficial results within a few hours after application; whereas, the help hoped for from the activities of some introduced parasite is at the best problematic, and one must be willing, after waiting perhaps for years, to accept ultimate failure.

On the other hand, in the event of success crowning the efforts of the parasitologist, the results secured may be of incalculable monetary value to the world at large.

While in sympathy with and fully realising the great economic importance of parasite control, I would advise our farmers not to neglect the practice of such artificial methods of controlling their chief cane insects as are recommended from time to time in the "Monthly Reports" and "Entomological Hints" published by our Sugar Bureau in the "Queensland Agricultural Journal," "Australian Sugar Journal," and other papers.

Lepidopterous Pests of Cane.

"Army Worms."

Serious damage to cane caused by army worms was reported to this Experiment Station last February by farmers at Highleigh and Edmonton, these attacks extending over areas of from 3 to 4 up to 20 acres.

4. Division of Entomology—*continued.*

In one instance, Mr. A. N. Burns noticed that "the larvæ had eaten to ground level a field of about 20 acres of young corn, in three days, and were then moving en masse into canefields which bounded the eaten corn on three sides. At noon the day after the larvæ had left the corn, the first seven rows of one of these areas of cane were very badly damaged; the larvæ were at this stage slightly over half grown, so that the greatest amount of damage had still to come. They were steadily advancing, and it is quite probable that before evening another six or eight rows of cane would have been attacked. On another side of the eaten-out cornfield another road had to be crossed by the larvæ before they could reach the cane; every blade of grass (crowsfoot) on this track had been eaten, and the larvæ were pouring into the cane in numbers so great that it was impossible to walk without destroying probably as many as fifty at each step."

The insect responsible in this case was *Laphygma exempta* Walk., an account of which was published by the present writer in 1921 ("Queensland Agricultural Journal," vol. xvi., pp. 276-80).

Satisfactory control was obtained by spraying a few clean rows of cane in front of the advancing army of caterpillars with lead arsenate (2 lb. in 50 gallons water).

Outbreaks of the caterpillars of *Cirphis loreyi* Dup. and *C. unipuncta* Haw. occurred also at Daradgee, Gordonvale, Hambledon, and Highleigh, during September, 1925, two dipterous and three hymenopterous parasites being obtained from a number of these larvæ collected for breeding purposes.

When breeding army worms at the laboratory during August last, two of the caterpillars associated with those of *Cirphis loreyi* produced moths of a species not hitherto recorded by us as being injurious to sugar-cane. This insect, which proved to be *Cirphis irregularis* Walk., may perhaps later on be found sufficiently destructive to warrant its being included in our list of minor pests of the sugar-cane.

Large Moth-borer.

Caterpillars of *Phragmatiphila truncata* Walk. were much in evidence last season throughout our Northern canefields.

They usually tunnel in the centre of young shoots of ratoon and plant cane, causing "dead hearts," but occasionally attack mature canesticks, selecting by preference the softer top portion close to the heart-leaves.

A braconid parasite, *Apanteles nonagriæ* Oll., has been bred on several occasions from caterpillars of this moth collected by the writer at Pyramid, near Cairns (see Bulletin No. 17, Div. of Entomology, Bureau of Sugar Experiment Stations, pp. 64, 69, 72).

Field Work.

Experiment Plots.

These plots were laid down by Messrs. Burns and Mungomery on high-land red volcanic soil at Meringa, between the dates 19th January to 26th February.

Insecticides tested were:—(1) Paradichlor., (2) Calcium cyanide, (3) "Chlorocide," (4) "See Kay," (5) Benzine and Naphthalene, (6) Shell Benzine, (7) Dehydrated Tar.

Briefly summarised, the results obtained were as follows:—

(1) *Paradichlor.* (¼-oz. doses, finely sifted).—Applied by means of a Massey-Harris corn planter adapted for this class of work, which dropped the doses about 15 inches apart. The cane-rows were treated on both sides and about 8 inches from centres of stools.

Result.—48.4 per cent. in the difference of grub-infestation between the treated and control plots, in favour of the fumigated cane. A second plot, on which the paradichlor. was applied with a hand injector, gave 49·3 per cent. less grub-infestation of the treated cane than in the control block. With normal weather conditions and proper cultivation Mr. Burns was of opinion that this experiment would undoubtedly have given excellent results.

(2) *Calcium Cyanide* (flakes).—This plot was injected with ½-drachm doses, and final examination showed a difference of 36·7 per cent. in grub-infestation between the treated and control areas in favour of the former.

(3) *Chlorocide.*—Owing to slightness of grub-infestation the plot treated with this fumigant yielded inconclusive results.

(4) *See Kay.*—Few or no grubs were present among the stools of this experiment plot, so that results were inconclusive.

(5) *Benzine and Naphthalene.*—This experiment gave a difference of 15·5 per cent. less grub-infestation in the treated cane as compared with the control block. In this case 4-drachm doses were applied by means of a hand injector.

(6) *Shell Benzine* (4-drachm doses).—This plot was considered by Mr. Burns to have given even better results than that fumigated with benzine and naphthalene in saturated solution, the results obtained being 16·6 per cent. less grub-infestation in the treated cane than in the control plot.

(7) *Dehydrated Tar.*—Results from this plot were greatly affected by prolonged dryness of the soil, but went to show that dipping the ends of sets in this tar before planting protects same from invasion by subterranean larvæ, &c., and does not prevent normal germination of the eyes.

The above results from these plots cannot, in the opinion of Mr. Burns, be regarded as by any means indicative of the best results obtainable from the fumigants used, nor yet even of the ordinary amount of efficency from any of the doses employed.

"At the time of putting down each experiment the soil," he reported, "was fairly dry, and very hard, and the cane rows weedy and unworked. Shortly afterwards it was all scarified, but only a couple of inches deep; and long since the weeds have grown to such an extent as in many places to outgrow the cane, and the soil has become consolidated, and the surface encrusted. The plots that are affected most by dry weather are the paradichlor., calcium cyanide, benzine and naphthalene, and benzine experiments, being all either on top of or on the slope of a hill."

4. Division of Entomology—*continued.*

Cane-Grub Infestation at Daradgee.

During August last the Assistant Entomologist, Mr. A. N. Burns, was instructed to visit Daradgee for the purpose of reporting on the severe damage caused there last season by *Lepidoderma albohirtum*. This infestation was practically confined to thirteen different selections, four of which were found to be very badly attacked, seven moderately to seriously affected, and four only slightly grub-eaten. The soil was red volcanic of a friable nature, and it was extremely interesting to note, from data supplied by Mr. Burns, that infestation in every area examined occurred either on hill tops or on slopes leading up to elevated ridges.

The four most badly stricken areas, comprising about 120 acres of hilly country, were situated in the immediate vicinity of scrub land. About 80 acres were seriously injured, 160 acres moderately so, and about 40 lightly infested.

Visit to South Johnstone.

On 12th July the Assistant Entomologist, Mr. A. N. Burns, was instructed to visit the South Johnstone district, where the beetle-borer (*Rhabdocnemis obscurus* Boisd.) has proved unusually troublesome during the last two seasons.

Practically in nearly every instance severe infestation was found to occur only in standover or fallen cane, growing in damp situations or along creek banks. This was particularly noticeable in plantations bordering the Johnstone River, where the soil and undergrowth often continues in a moist condition for months together. In situations such as these rats were found to be very plentiful.

The following localities were visited:—Basilisk, Five-Mile, Nerada, Silkwood, No. 4 Branch, Japoon, Eight-mile, Wylie's Siding, Sims' Siding, Miskin Point, Ariottis' Siding.

No. 2 Branch of the mill area—which includes the localties Myers Siding, Mena Creek, Main Line, and Mill area—proved to be, taken as a whole, the most generally borer-affected area.

The various farms visited were scattered over an area of nearly 7 square miles in that part of the parish of Johnstone which is bounded on the Mourilyan side by the Johnstone River and on the south by the Stewart and Miskin Creeks, forming a boundary to Japoon.

Control Work against the Giant Termite.

Recent laboratory experiments in this connection have shown that the most promising remedial measures against *Mastotermes darwiniensis* Frogg. are those of soil fumigation around affected stools of young plant cane at the time of "striking"; dipping the sets in repellent solutions; placing deterrents in the drills when planting; and laying poison-baits in or close to termite-infested stumps, posts, roots, &c.

Our later efforts have been directed against the nest or termitarium, with view to discovery of simple methods of fumigating same, a phase of this form of control which aims a blow, as it were, at the source of the trouble, by affording one a chance to destroy simply and inexpensively in the one operation many thousands of individuals, including workers, soldiers, and nymphs, together with the queen mother of the community.

The internal structure of the termitarium built by these insects generally consists of innumerable thin plate-like, woody-looking or papery fragments of irregular form and size, arranged in a compact mass, which being open or well aerated is very suitable for treatment with fumigants either in dust or vapour form. Amongst those tested by us, ordinary shell benzine and "cyanogas" were the two that gave best results, the former giving a 95 per cent. mortality, which included all the workers and the queen termite. Fumigation of another termitarium with benzine yielded a kill of 100 per cent. Two nests which were each treated with 2 oz. of cyanogas gave a mortality of 95 to 97 per cent. The termites used in the above experiments were specimens of the genera *Eutermes* and *Coptotermes*.

Visit to the Lower Burdekin District.

On 16th August Mr. J. H. Buzacott, Assistant to Entomologist, was instructed to carry out certain field experiments against *Mastotermes darwiniensis*, and grubs of scarabæid cane-beetles.

One of these field tests consisted in planting sets that had been dipped in a solution of carbolineum emulsified with hard soap. Other sets were planted after dipping their ends in dehydrated tar. Both these experiments were carried out on land usually infested by this termite. Endeavours to obtain specimens of the queen of this species were unsuccessful.

Visit to the Lower Burdekin District.

Towards the end of November Mr. G. Bates, Assistant to Entomologist, was sent by Mr. Burns to Ayr to carry out certain experiments against *Mastotermes darwiniensis* Frogg. and grubs of Scarabæidæ affecting cane-roots. The large moth-borer of cane was noticed at Giru and Rita Island. Experiments with paradichlor. were rendered inconclusive, owing to their having been carried out on land which was free from the presence of the giant termite.

Entomological Exhibits at Agricultural Show.

Meringa Experiment Station was well represented last season at the annual show held at Innisfail by the Johnstone River Agricultural Society. Our comprehensive exhibit comprised several large show-cases, illustrating amongst other things the life-cycle stages and primary insect enemies of notable cane-pests, such as the beetle-borer (*Rhabdocnemis obscurus* Boisd.) and greyback cockchafer (*Lepidoderma albohirtum* Waterh.).

Various coloured charts and diagrams dealing with certain phases of control work, &c., together with numerous spirit specimens of the grubs, pupæ, and eggs of cane-beetles, helped to form an attractive and educational display.

This exhibit was under the charge of Mr. R. W. Mungomery, Assistant Entomologist, who while present at the show was able to discuss with growers interested any matters regarding the control of insects affecting their cane.

4. Division of Entomology—*continued.*

Publications.

Bulletin No. 19, Division of Entomology, entitled Notes on Queensland Cane Insects and their Control (third series), 1926, pp. 1 to 72, illustrated by eleven plates and ten inset figures.

Science Paper, entitled On the Life History and Control of *Lepidoderma albohirtum* Waterh., Sugar cane Pest of North Queensland. Proceedings of the Pan-Pacific Science Congress (Australia) 1923, vol. i., pp. 362-376, and "Queensland Agricultural Journal," vol. xxi., pp. 28-33, 91-97, 1924.

Science Notes.—The Economic Value of Certain Queensland Parasitic Insects. "Queensland Agricultural Journal," vol. xxii., pp. 113-116, one plate.

Monthly Hints to Canegrowers.—"Queensland Agricultural Journal":—September Hints, vol. xxiv., pp. 224-225; January Hints (by Messrs. A. N. Burns and R. W. Mungomery, Assistant Entomologists), vol. xxv., pp. 5-6; April Hints (by Mr A. N. Burns), vol. xxv., pp. 322-323; May Hints, vol. xxv., pp. 415-416; June Hints, vol. xxv., p. 496; July Hints, vol. xxvi., p. 50; August Hints, vol. xxvi., pp. 220-221.

"Australian Sugar Journal":—September Hints, vol. xvii., p. 351; January Hints (by Messrs. A. N. Burns and R. W. Mungomery), vol. xvii., pp. 626-627; February Hints (by Mr. A. N. Burns), vol. xvii., p. 701; March Hints (by Mr. A. N. Burns), vol. xvii., p. 739; May Hints, vol. xviii., p. 102; June Hints, vol. xviii., pp. 165-166; July Hints, vol. xviii., p. 216; August Hints, vol. xviii., pp. 274-275.

Monthly Progress Reports.—"Queensland Agricultural Journal":—September, 1915, vol. xxiv., pp. 221-223; October (by Messrs. A. N. Burns and R. W. Mungomery), vol. xxiv., pp. 334-336; November (by Messrs. Burns and Mungomery), vol. xxiv., pp. 443-444; December (by Messrs. Burns and Mungomery), vol. xxiv., pp. 516-517; January, vol. xxv., pp. 202-203; February, vol. xxv., pp. 204-205; March (by Mr. Burns, Assistant Entomologist), vol. xxv., pp. 321-322; April, vol. xxv., pp. 418-419; May, vol. xxv., pp. 497-498; June, vol. xxvi., pp. 47-50; July and August, vol. xxvi., pp. 215-220. "Australian Sugar Journal":—September, vol. xvii., pp. 353-355; October (by Messrs. Burns and Mungomery, Assistant Entomologists), vol. xvii., pp. 499-502; November (by Messrs. Burns and Mungomery), vol. xvii., pp. 567-568; December (by Messrs. Burns and Mungomery), vol. xvii., pp. 628-629; January (by Mr. A. N. Burns), vol. xvii., pp. 701-703; February (by Mr. A. N. Burns), vol. xvii., pp. 741-742; March (by Mr. A. N. Burns), vol. xviii., pp. 51-52; April, vol. xviii., pp. 103-105; May, vol. xviii., pp. 166-169; June, vol. xviii., pp. 216-218; July, vol. xviii., pp. 275-277; August, vol. xviii., pp. 348-349.

Breeding of Economic Insects.

The following insects have been bred by us at Meringa Laboratories during the last twelve months, either from eggs laid by insects confined in breeding cages or from larvæ or pupæ collected in the field, for the purpose of obtaining good specimens of various species for our Office Collection, or for studying their life-cycle stages:—

Agromyza lantanæ.—Bred from lantana berries collected at Meringa.

Anthela acuta Walk.—Eating cane leaves at South Johnstone.

Bibionid sp.—Bred from rotten cane sticks.

Braconid sp.—Bred from caterpillars of *Phragmatiphila truncata* Walk.

Campsomeris tasmaniensis Sauss.

Campsomeris radula Fab.

Chalcis sp.—Bred from larvæ of *Padraona marnas.*

Chloridea obsoleta Say.

Cirphis unipuncta Haw.

Cirphis loreyi Dup.—Parasites bred from, and imagines.

Cosmopteryx dulcivora Meyr.—Parasites bred from.

Gonocephalum carpentariæ Blkb.—To study life-cycle stages.

Laphygma exempta Walk.—Bred from eggs collected on cane.

Lepidiota caudata Blkb.—Bred from pupæ in laboratory.

Lepidiota froggatti Macl.

Metoponia rubriceps Macq.

Melanitis leda Linn.—Bred from eggs placed on cane leaves.

Metoponit rubriceps Macq.

Nemestrinidæ sp.—Larvæ found feeding on pupæ of cane-beetle, *Lepidoderma albohirtum.*

Opogonia glycyphaga Meyr.—Bred for study of life-cycle.

Padraona marnas Feld.

Phragmatiphila truncata Walk.

Pseudoholophylla furfuracea Burm.—Larvæ bred for purpose of obtaining pupæ and eggs.

Remigia frugalis.—Attacking young plant cane.

Sideridis irregularis Walk.—Larvæ eating cane leaves.

Tachinidæ, sp. of.—Bred from larvæ of *Cirphis unipuncta.*

Triscolia rubiginosa Fabr.—Four specimens of this digger-wasp were brought alive from Java by Mr. H. Freeman, of the Colonial Sugar Refining Co., and left with us to be experimented with against grubs of *L. albohirtum.* These comprised one female and three male specimens. For an account of this experimentation see "Queensland Agricultural Journal," vol. xxvi., pp. 49, 50, 215-217, 218-219.

Termitidæ, sp. of.—Attacking cane sets after planting.

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SOUTHERN DIVISION OF ENTOMOLOGY.

Early in the present year an Entomological Laboratory was erected at the Sugar Experiment Station, Bundaberg, and placed in charge of Mr. R. W. Mungomery, Assistant Entomologist. Mr. Mungomery has now commenced work on the Southern cane grubs, which, in many instances, differ considerably from those prevalent in the North. He is also investigating other insects affecting sugar-cane. Mr. Mungomery has done excellent work and is highly spoken of by farmers generally.

4. Division of Entomology—*continued.*

The following report embraces the work done by Mr. Mungomery in the Southern cane districts (including Mackay) :—

Southern Sugar Experiment Station,
Bundaberg.

The Director,
Bureau of Sugar Experiment Stations,
Brisbane.

Sir,—With reference to the work performed for the period January to October inclusive, I have the honour to submit the following report:—

Since commencing duties at the Southern Sugar Experiment Station for the purpose of carrying out investigations on the injurious insect pests of sugar-cane, work centred chiefly on the inspection of cane farms in the many districts from Mackay to Beenleigh; and to avoid confusion with the work performed by the officers of the Meringa Laboratory all cane areas referred to herein, unless otherwise stated, signify those comprised between Mackay on the northern and Beenleigh on the southern limit. In this connection over 370 farms were visited and advice was given to each grower as to the most efficient means yet devised to combat the various pests that were met with in the several districts. Where no previous control work had yet been attempted against new pests, suggestions were made, compatible with the growing and cultivation of cane under the present economic conditions. By this means, not only was I able to find out the actual insects that were responsible for injuries to sugar-cane, but I was also able to gather information concerning the relative importance of the damage done by each pest which came under my notice, and this data was of value in deciding on which species investigation and control work should be concentrated in the immediate future.

In similarity with the findings of investigations in the North of Queensland, where most of the entomological research in connection with sugar-cane has hitherto been carried out, all evidence has unmistakably pointed to the verdict against the "white grubs" as being the worst marauders in our Southern areas. These "white grubs" are the larvæ of the Scarabæidæ, a large family of beetles, whose distribution is almost world-wide. They occupy an important position in economic entomology and have for many years engaged the attention of leading entomologists throughout America and Europe. Their chief injury is to eat the roots which the plant from time to time sends out, and in this way the stool does not get sufficient nourishment for its proper development; consequently the crop remains stunted and assumes a yellowish appearance. In cases of severe infestation, such as occurred at Childers and at Mackay this year, the plant may be killed outright, and this represents an absolute loss to the grower. In infestations of a less severe nature there is a direct loss in tonnage at the time, as well as an indirect effect, in that subsequent ratoon crops owing to the root system being so badly damaged are necessarily poor and thin. Grubs also eat the eyes and ringbark the nodes of newly planted sets, so that the plant is subject to their attack at all stages of growth.

On the whole our Queensland Scarabæid fauna is a very rich one, and it is not surprising that, although we meet with some grubs here which are the same as the Northern species, the majority of the others occurring here vary considerably, so that much initial breeding work will have to be done in tracing these grubs to the beetles which are responsible for their appearance in the canefields. This breeding work has been commenced, and some of the worst and most common grubs will this year be reared through to the adult or beetle stage, and it is hoped that further species will be added to the breeding cages in the coming year. Such work to the layman must appear as so much waste of time, but it is nevertheless essential if the pests are to be attacked from a scientific standpoint and brought to complete subjugation.

The chief grubs occurring here are *Lepidoderma albohirtum* Waterh., *Lepidiota frenchi* Blackburn, *Pseudoholophylla furfuracea* Burm., and another melolonthid unidentified, but previously supposed to be *Lepidiota grata* Blackburn, and described as such by Dr. Illingworth as occurring at Gin Gin (see Bulletin 16, page 55). Other grubs belonging to the genera Dasygnathus, Anoplognathus, Neso, Heteronyx, &c., are present and have been taken behind ploughs in cane land, but they have not yet been noticed to occasion serious injury to cane.

Other insects are receiving attention and these include the moth borer (*Phragmatiphila truncata* Walk.), the weevil borer (*Rhabdocnemis obscurus* Boisd.), "wireworms," i.e., the larvæ of two separate families of beetles, the Elateridæ and Tenebrionidæ, the soldier fly (*Metoponia rubriceps* Macq.), and various plant-eating beetles (*Rhyparida sp.*) of the family Chrysomelidæ, all of which do a certain amount of injury to sugar-cane.

Experiments.

Reference was previously made to control measures. It will be recognised that it is most unwise to recommend any form of control before the life history and habits of the pests under consideration have been thoroughly investigated, but, as this may occupy from two to three years in the case of white grubs, reliance has been placed on the apparent similarity in many respects of the habits of the Southern species with those melolonthids which have been investigated at the Meringa Laboratory, and the same artificial control measures that are in vogue in the North have for the present been adopted in the case of these species. Such control is directed against the early larval stages. This consists in the use of paradichlor. or carbon bisulphide, which is injected into the soil by means of a hand injector. Each dose of paradichlor. that is delivered into the soil is placed so that the chemical remains near the roots of the cane and gradually gives off toxic vapours which succeed in killing any insect life that comes within its effective influence. Trial plots were established at Childers, using paradichlor. in $\frac{1}{8}$ oz. injected 15 in. apart on each side of the row of cane, in both plant and ratoon blocks. These plots were laid out in January, but, due to the long-continued dry conditions which prevailed after that month, no well-defined results showing differences in tonnage or stand were obtained. Nevertheless a high mortality

4. Division of Entomology—*continued.*

of young first-stage grubs took place, though in some plots as many as 30 per cent. of the young plants were adversely affected by the combined effects of dry weather and fumigant, so that the experiment was useful in determining to what limits fumigation could be carried during dry periods. The effect of the paradichlor. on the ratoons was not noticeable, but in this case erratic results in mortality were obtained ranging from 50 to 90 per cent., and therefore in the coming year the following points will require elucidation:—

(1) Amount of dosage required;
(2) Distance of dose from plant;
(3) Depth at which dose should be placed in the ground;
(4) Interval between each dose;
(5) Correct condition of soil;
(6) Optimum conditions of temperature and moisture.

The main object of these experimental plots was not for the purpose of accumulating a vast quantity of data concerning the behaviour of the grubs towards fumigation, for the time was not then opportune, and much time was spent subsequently inspecting other districts, when it ordinarily would have been devoted to observations on these plots, but the intention was to demonstrate to growers and acquaint them with the process and methods of injecting paradichlor., and this desirable result was achieved. Thus one farmer alone has on order 6 cwt. of this material in anticipation of a large flight of beetles and consequent heavy reinfestation of grubs this coming season, and others in different localities have ordered smaller amounts for similar work.

The following districts were visited, and a brief résumé is given of the insects in each place found associated with cane:—

Mackay.—This was the most northern limit of my inspections, which took place in June-July and again in the latter part of September. The insect fauna of Mackay and the outlying portions greatly resembles that of Cairns, as far as its association with sugar-cane is concerned, so that this district will call for little original research. The grub of the greyback beetle (*L. albohirtum*) has been particularly troublesome this year, and whole fields of cane have been eaten out at Habana, Mount Jukes, and at Sarina, while the infestation has been more sporadic in other localities. The weevil borer (*R. obscurus*) has gained a footing in many parts, and though in its present sphere of activity it has not been causing great losses, if unchecked it may assume serious proportions. So far the tachinid parasite (*Ceromasia sphenophori* Vill.) has not been introduced to combat it, and where light infestations have been found growers might very profitably get rid of this pest by being careful with the selection of plants, and cleaning up old cane stalks that are sometimes left lying about the fields. The moth borer (*P. truncata*) compared to the former borer is here of minor importance. The soldier fly (*M. rubriceps*) was met with at Finch Hatton and its larvæ were seen to have damaged sets which had been planted during the dry period July-August, but it likewise is relegated to an inferior position. Wireworms (Elateridæ) and mole crickets (Grylloptalpinæ) were found causing injury to cane sets in the flat clayey soils, known locally as "glue-pot" land. Other scarabæid grubs, such as *L. frenchi, Anoplognathus sp., Heteronyx sp., Cetonid sp.,* were taken in canefields, but nowhere did I find them damaging cane to any extent. The leaf miner (*Cosmopteryx dulcivora*) and linear bug (*Phœnacantha australica* Kirk.) were both noticed but their effects are practically negligible, and these together with *L. albohirtum* and *R. obscurus* are probably at their southern limit in this district.

Bundaberg and *Gin Gin.*—Observations were carried out in these districts during February-May, July-September, and in October. White grubs are the worst insect pests here, and chief of these are:—

(1) *P. furfuracea,* occurring in the Gin Gin, Bucca, Goodwood, Bingera, and Woongarra districts.
(2) *L. frenchi,* found at Gin Gin and the Elliott Heads.
(3) Another undetermined melolonthid found at the Burnett and Elliott Heads, South Kalkie, Gooburrum, Avoca, Pine Creek, Gin Gin, and Goodwood.

All have been responsible for serious damage in parts of these areas in past years, and especially so this year, when the drought has been so long continued. *P. truncata* is rather severe in its infestations, and large losses were inflicted on the older canes along the river flats, some paddocks of which had been neglected and allowed to become overgrown with grasses. *Rhyparida morosa* proved troublesome to some young spring plant cane near Bingera, but its damage was very limited. Other scarabæid grubs taken included *Dasygnathus australis-dejeani, Anoplognathus boisduvali,* and since these are not plentiful their injury is not extensive.

Isis District.—Visited in January, April, and August. The worst and only serious pest of great import is *P. furfuracea.* This grub is present in the rich scrub lands in the centre of the district, and farms situated nearer the forest are suffering little or no loss from this source. This year will long be remembered as a bad one for grubs, and cane has died out in large patches from their inroads. Numerous parasites are to be found, but despite the fact that they can be seen to exercise an appreciable control the pest still holds sway. Chief of these parasitic agencies are the muscardine fungus (*Metarrhizium anisopliæ*), bacterial diseases, and various species of Scoliidæ, some of which belong to the genus Campsomeris. Predators are also plentiful, including members of the families Asilidæ and Elateridæ. Other grubs have been found behind ploughs, being species of *Isodon, Neso, Heteronyx, Dasygnathus, Anoplognathus,* &c., but none of these individually have called for repressive measures.

Pialba, Maryborough, Yerra, and *Mount Bauple.*—Sugar-growing centres south of the Isis district suffer comparatively little from white grubs attacking well-established cane. The worst damage in these districts is that done to the plants or sets, and in this instance injuries are caused mainly through wireworms (undetermined species of Elateridæ) and the "black beetle" (*Pentodon australis* Blackburn), grubs being of secondary importance. Both the black

beetle and wireworm eat into the eyes, causing destruction of the set, and they are especially partial to the tender central tissues of young shoots, causing "dead hearts." Pialba farms are often subject to attack from these pests, and there seems to be some association between them and newly planted land which previously has been cropped with paspalum grass. White ants (Termites) have been responsible for minor injury to plants in the new lands of Yerra and Mount Bauple. The moth borer also occurs in all of these localities.

Moreton District.—Visited in April. Insects here play a very unimportant role except perhaps in the possible spread of the gumming and mosaic diseases, both of which are serious factors in curtailing, and in the treatment of, the sugar yield. Species of white grubs (unidentified) are troublesome to plants at Rosemount, Bli Bli, and Coolum, but these usually disappear after the land has been under cultivation for a number of years. *Pentodon australis* also gives bother along the Maroochy River, and its occurrence and habits in relation to paspalum are identical with those of the Pialba district. Mole crickets are occasionally plentiful in the swampy areas.

Beenleigh District.—Several of the growers here on small holdings frequently put stable manure on their land, and this tends to become infested with grubs of *Isodon puncticollis*. When cane is subsequently planted on these blocks, these grubs turn their attention to the young plants, which in dry times they frequently ruin. *Pentodon australis* also helps to exact toll from these newly planted sets and causes defective strikes. However, Beenleigh is a district comparatively free from any serious insect pests.

Official Insect Collection.

A collection of insects attacking cane in the Southern districts, as well as their parasites and predators, is gradually being gathered together at the laboratory of the Southern Sugar Experiment Station, Bundaberg, for the purposes of reference. Growers are invited to inspect these and become acquainted with the various insect pests with which they have to contend, and also to bring under our notice any insect hitherto unrecorded which is in any way associated with the economics of sugar-cane.

R. W. MUNGOMERY,
Assistant Entomologist.

5.—INVESTIGATIONS INTO DISEASES OF CANE.

The investigations into diseases of sugar-cane were carried out by Mr. W. Cottrell-Dormer up till March this year, when arrangements were made by which he entered the University. At the beginning of 1926 it was arranged that Mr. N. L. Kelly, a cadet student of the Bureau at the University, should come out to the field and take up Mr. Dormer's work till the end of the year. Mr. Kelly, late last year (1925), spent some time with the Pathologist to the Colonial Sugar Refining Company, to which corporation and to Mr. North the thanks of the Bureau are due for the facilities placed at his disposal and the information and instruction afforded to him. Mr. Kelly accompanied Mr. Dormer in field investigations during the early part of the year and then took up the work. Both Messrs. Dormer and Kelly's work has been of much value. Mr. Kelly resumes study at the University next year when another cadet student, Mr. Ferguson Wood, will carry on investigations. In 1928 it is hoped to have a Pathological Division fully established with laboratory and staff, as by that time Mr. Arthur Bell, who is the pathological student travelling abroad, should be back, and graduates from the Queensland University should also be available.

Mr. Kelly has supplied the following report on his work:—

Sir,—I desire to submit the following report on my activities:—

Since March, 1926, 678 farms were visited as shown in the following table:—

Districts Visited.	Number of Farms Visited.	Number of Farms Showing—					Month Visited.
		Fiji Disease.	Gumming.	Leaf Scald.	Leaf Stripe.	Mosaic.	
Beenleigh	17	11	1	..	..	12	April
Nambour	81	..	46	1	..	49	March
Mount Bauple	13	..	1	..	..	9	April
Maryborough	61	8	3	..	..	20	April
Childers	56	..	19	..	..	21	May
Bundaberg	60	..	29	..	3	38	May-June
Mackay	114	..	5	..	3	17	June-July
Proserpine	28	..	..	..	..	1	July
Home Hill, Ayr, and Giru	88	..	..	..	21	4	August
Ingham	50	..	7	..	..	1	August-September
Tully	24	..	..	7	..	..	September
Innisfail	56	..	..	47	..	..	September-October
Babinda	30	..	..	29	..	..	October

5. Investigations into Diseases—*continued.*

Since every farm could not be inspected, it is obvious that these figures will not give the percentage of farms infected by the various diseases in any locality. For example, Maryborough is but lightly infected with Fiji disease, and probably nearly every infected farm was visited, so that the percentage infection is lighter than it would appear by the figures given; whereas the scattered Beenleigh district is probably as heavily or even more heavily infected than the figures indicate.

In my reports during the year accounts were given of the above-mentioned five major diseases, published April to July, under the headings of (1) Distribution; (2) Losses; (3) Symptoms; (4) Cause; (5) Modes of Infection; and (6) Control, which latter may be summed up generally under (*a*) eradication; (*b*) seed selection, and (*c*) resistant varieties. There still remains a wide field of investigation into (*a*) modes of infection and (*b*) the resistance of certain varieties to various diseases.

However willing a farmer may be, expert assistance is required for the control of these diseases, and to this end students are being trained at the University, in the field, and abroad. In the meantime I am pleased to be able to report that the cane inspectors of certain mills have shown great interest in the work, having learned to identify the major diseases prevalent in their districts, and are thus in the position to be of great assistance both to the Bureau and to their suppliers by helping in general control measures as prescribed by the Bureau.

At Nambour and surrounding district gumming disease was causing very heavy losses. A farmers' meeting was therefore convened in the town hall. A short address was given, the situation discussed, and a scheme was elaborated for the establishment by a private farmer of a nursery for the distribution of clean plants. The farm, situated at Kureelpa, was selected as being beyond the range of infection from other canes. The farmers adopted the scheme, and it is hoped that distribution will commence in 1927.

At Childers, at the invitation of the head master, Mr. Irvine, an address was given to the High School students with the object of interesting them in scientific research in general and cane pathology in particular.

Innisfail and Babinda districts will need careful supervision to control their leaf-scald, which is causing considerable losses to most growers, and is to be found on practically every farm in these districts. Several stools illustrative of the damage caused by, and the symptoms of, leaf-scald were exhibited at the Innisfail show, and proved interesting to the farmers.

A summary of observations is given below:—

Fiji Disease.

A short account of this disease was published in May, 1926. It was first recorded for Queensland this year, when it had already obtained a foothold in two districts. The spread of this disease into Queensland well demonstrates that it is not wise to transfer sets from one district or State to another without efficient quarantine regulations, such as are now being instituted. It is by far the most destructive cane disease to the variety D. 1135, which was favoured in South Queensland. A circular has been sent out to enlist the support of the growers in a campaign for the eradication of this disease, which was encountered in the following localities:—

Beenleigh.—Considerable infection on eleven farms at Alberton, Pimpama Island, Carbrook, and Eagleby, in D. 1135, in one farm also in Q. 813, though the latter variety did not show the severe stunting visible in D. 1135.

Maryborough.—On eight farms, three at Tinana and five at Bidwell, in D. 1135.

Gumming Disease

(*Bacterium vascularum* (Cobb) Greig Smith).

A short account of this disease, by the writer, was published in April, 1926. It is sufficiently serious and widespread to cause considerable loss to the growers and millers of Moreton, Isis Central, Millaquin, Qunaba, Fairymead, and probably Beenleigh districts. The infection in the Ingham district has been considerably reduced in the last two years, and great credit is due to Mr. K. Gard and his assistants at Macknade and Victoria for their efficient control of the planting.

The disease was encountered in the following localities:—

Beenleigh.—On one farm at Pimpama Island in D. 1135. At the time of the writer's visit the symptoms were obscure, and the disease is probably more widely distributed, judging by the reports of the mills.

Nambour.—Heavy to light infection on forty-six farms distributed through every locality visited, in D. 1135, N.G. 15, Gingila, M. 1900, H.Q. 285, E.K. 28, Q. 813, &c.

Mount Bauple.—Considerable infection in D. 1135 on one farm near the mill.

Maryborough.—On two farms in The Pocket and one at Bidwell, in D. 1135.

Childers.—On one farm at South Isis, two at Goodwood, and sixteen at North Isis and Cordalba, in D. 1135, N.G. 15, and H.Q. 285. The degree of infection around Cordalba is comparatively high.

Bundaberg.—On twenty-nine farms in practically every locality except Bingera and Wallaville, in D. 1135, N.G. 15, H.Q. 426.

Mackay.—On six farms at The Lagoon, Dumbleton, Richmond, and Upper Plane Creek, chiefly in D. 1135, also in "Goldfinch's Blue" and several rare varieties.

Ingham.—On five farms at Forest Home, Gairloch, and Halifax, and two at Toobanna, in H.Q. 426 and N.G. 24.

Cairns.—On two farms at Aloomba, causing damage in H. 109; and suspected in three others, in N.G. 15, Oba Badila, D. 1135, and H.Q. 426, where it was seen in 1925. This area has been quarantined, and the farmers concerned should plough out the infected crops after harvesting.

Leaf Scald

(*Bacterium* sp. (unnamed)).

A short account of this disease by the writer was also published in April, 1926. It has reached epidemic proportions at Innisfail and Babinda,

5. Investigations into Diseases—*continued.*

the losses in a few cases being particularly heavy. It was in connection with the control of this disease that the aid of the cane inspectors was invoked at Tully, Mourilyan, and Babinda. At Goondi the Agriculturist, Mr. J. Trivett, carries out disease and pest control in conjunction with his other experiments, and kindly gave the writer valuable information on these matters.

The disease was encountered in the following localities:—

Nambour.—Recorded for the first time on the Maroochy River on one farm, and suspected in two adjoining ones, in Mahona, N.G. 16, and N.G. 15. It has apparently not spread far during the five years in which Mahona has been growing on this farm.

Tully.—Considerable to light infection on seven farms near Midgenoo, in N.G. 15. This stock was introduced from El Arish in 1922, and again emphasises the danger of careless circulation of plants.

Innisfail.—The disease was identified on forty-seven farms out of the fifty-six visited, but I am convinced that practically every farm in the district is infected to some extent. In the South Johnstone area it was found at Miskin's Siding, Meyer's Siding, No. 1 Branch, No. 6 Branch, Coorumba, and Kalbo, in H.Q. 426, N.G. 24 A, and N.G. 15. In the Mourilyan area it was found at Mourilyan, Boogan, Moresby, and Liverpool Creek. In the Goondi area, Mundoo, Goondi, Darradgee, and Garradunga were infected, 7 R. 428 suffering badly on one farm at Mundoo. No resistant variety was found, though N.G. 15 (Badila) is more tolerant than H.Q. 426, 7 R. 428, and N.G. 24.

Babinda.—The disease was encountered on twenty-nine of the thirty farms visited at Bartle Frere, Pawngilly, Mirriwinni, Buckland's Road, Over River, Mopo, Babinda, Babinda East, Clare Road, East Russell, Palma, Frenchman's Creek, Harvey Creek, and Deeral, in H.Q. 426, N.G. 24 A, and N.G. 15, there being considerable losses in many instances.

Cairns.—Considerable infection was found in all of the sub-districts of the Mulgrave Mill, and similarly in those of the Hambledon Mill, though they are less heavily infected, with the exception of the Freshwater area, which in some parts is more heavily infected. The varieties attacked are H.Q. 426, N.G. 24, less seriously N.G. 15, and in one case D. 1135.

Mossman.—Considerable infection in all of the sub-districts in H.Q. 426 and N.G. 24.

Leaf Stripe

(*Sclerospora sacchari* Miyake).

A short account of this disease by the writer was published in July, 1926. It was encountered in the following localities:—

Bundaberg.—A small outbreak on two farms on Windermere road, in M. 1900. Slight infection on one farm at Bingera, in D. 1135.

Mackay.—Slight infection on one farm at The Lagoon in 7 R. 428 and P.O.J. 2714, on one farm at Farleigh in P.O.J. 2714, and on one farm at Dumbleton in E.K. 1.

Ayr.—Considerable infection on one farm at Home Hill East in B. 208 and H.Q. 426. Considerable infection in B. 208 on sixteen farms at Ayrdale, Maidavale, Klondike, Macdesme, but many fields at Jarvisfield are apparently healthy. Light infection in B. 208 on four farms scattered around Giru.

Cairns.—Heavy infection on three farms in Sawmill Pocket and Hambledon in 7 R. 428, and suspected in three farms planted with sets from these; in one case the D. 1135 adjoining has contracted the disease. Slight infection on one farm at Freshwater in 7 R. 428.

Mossman.—Considerable to heavy infection in nearly every field of B. 147 in the district, in one case having spread into Q. 813 adjoining.

Mosaic

(*A virus disease*).

A short account of this disease by the writer was published in June, 1926. It is more prevalent, and secondary infection apparently takes place more readily, in South Queensland than in the North. An investigation into what are the vectors of the disease in Queensland would be of value. The Corn Aphis (*Aphis maidis*) is a proved vector in America and Hawaii. Several fields of corn were found showing chlorosis around Innisfail. The farmers were advised to eradicate same in case of this being due to Mosaic.

The disease was encountered in the following localities:—

Beenleigh.—On twelve farms in all parts, in D. 1135, Q. 813, B. 208, and M. 1900.

Nambour.—On forty-nine farms in all parts, in Shahjahanpur No. 10, Gingila, Black Innis, M. 1900, H.Q. 285, D. 1135, Q. 813, and N.G. 15. N.G. 15 or Badila is fairly tolerant of the disease in these parts.

Mount Bauple.—On nine farms in all parts, in Shahjahanpur No. 10, M. 1900, Black Innis, Q. 822, Q. 855, and D. 1135. In one farm near the mill the fields of M. 1900 are infected to about 8 per cent.

Maryborough.—On twenty farms in The Pocket, Tinana, Bidwell, Yerra, and Pialba district, in Shahjahanpur No. 10, M. 1900, Black Innis, H.Q. 285, D. 1135, and Petite Senneville. Those farms inspected at the Island Plantation appeared free of every major disease.

Childers.—On twenty-one farms in all parts, in Shahjahanpur No. 10, M. 1900, Black Innis, H.Q. 285, and D. 1135. In one field of M. 1900 adjoining corn and sorghum secondary infection was particularly rapid.

Bundaberg.—On thirty-eight farms in all parts and in all varieties. It is most prevalent around Wallaville.

Mackay.—On seventeen farms in most parts of the district. The infection is light, except in one field of Black Innis, near Barcoo, where it exceeds 10 per cent.

Proserpine.—On one farm at Kelsey Creek in B. 208. The field is probably ploughed out now.

Ayr.—On one farm at Home Hill East in B. 208 and H.Q. 426; one farm at Jarvisfield in B. 208; and on two farms near Giru in B. 208.

6. Northern Sugar Experiment Station.

Ingham.—On one farm at Ripple Creek in H.Q. 426.

Cairns.—Slight infection in one field of H. 109 at Aloomba, and in the Shahjahanpur No. 10 in one field at Hambledon.

Mossman.—Slight infection in two fields of H.Q. 426 and M.Q. 1 at Mossman.

A disease after the nature of Top Rot was first noticed doing serious damage in M. 1900 at Wallaville. In this case the circumstances noted were that there had been a check in the growth followed by good rains. As around Ayr, Ingham, &c., it occurs mainly from November to January. I have not had an opportunity of studying its characteristics in these parts. In all cases the seasonal conditions exercise a profound influence on the seriousness of the disease. No control measures have yet been devised, and further investigation into the cause and transmission of the disease is necessary.

A sclerotial disease of the leaf sheath, which causes the death of stalks in overcrowded stools. was noted to be even more widespread than Top Rot around Tully, Innisfail, and Babinda.

Red Rot (*Colletotrichum falcatum* Went.).—This disease, which is also mainly due to unfavourable growing conditions, occurs in all our cane areas, particularly when the cane matures too early. It is most troublesome around Mackay in fully grown M. 1900 and M. 189 between October and January. Suggestions for its control were published in August.

Foot Rot, a fungus disease attacking the roots, occurs to a small extent in all of the districts visited. It attacks the cane from the soil, and is best controlled by careful preparation of the fields before planting, and a not too speedy closing in on the stools afterwards.

Iliau, a fungus disease of young shoots, was found in M. 1900 at Goodwood in the Childers district. Control measures were published in June, 1926.

N. L. KELLY.

The finding of Fiji disease in Queensland was regarded as a serious matter, and it is most probable that this disease was introduced by cane plants from New South Wales. Circulars warning growers of the danger of this malady were sent out to farmers in affected districts, and proclamations have been issued prohibiting, unless as prescribed, the introduction of cane plants from New South Wales and the removal of any plants of sugar-cane from any place situate in the south-eastern counties of Queensland—namely, Ward, Stanley, Canning, and March.

Numerous circulars and leaflets on cane diseases have been issued at various times during the year and are available on request at the Bureau's Office.

6.—WORK OF THE NORTHERN SUGAR EXPERIMENT STATION AT SOUTH JOHNSTONE.

The Northern Sugar Experiment Station is situate near the South Johnstone River, Innisfail district, on the opposite side to the South Johnstone sugar-mill.

Mr. P. H. McWalters, the Chemist in charge, has carried out his duties ably and well, and with Mr. S. J. Kelly, Assistant Chemist (whose work has also been of value), is responsible for the preparation of the tables appearing in this section of the report. In addition to analytical and experimental work in connection with the station, many thousand seedling canes have been raised.

METEOROLOGICAL.

The following weather notes have been furnished by the Chemist in charge:—

Notes on Growing Period—September, 1925, to August, 1926.

As far as the period of growth of canes is concerned, that from September, 1925, to August, 1926, brings under review a season with the lowest rainfall for the seven years' records of this station, the rainfall registered being only 67·33 inches; the average for the previous six years from 1919 to 1924 over a similar period being 130 inches. The lowest record, that of season 1923, was 78·3 inches, while the highest fall under registration at the station was in 1921, with 183·6 inches. It may be noted that, although the rainfall for the period under review was 11 inches lower than season 1923, the number of wet days was 145 as against 129 for 1923. The season 1923 for the Johnstone River district was one of the highest on record for yield of sugar per acre.

Reviewing the growing period, we find for the months September, October, and November, 1925, a total rainfall of 7·67 inches fairly evenly distributed within seven wet days in each month. Over this period the soils had sweetened up and were in good condition. The ratoons were vigorous and healthy throughout the district. At the middle of November it was noted that the plant canes were showing no appreciable headway in growth, and yellowing of the leaf was fairly pronounced. *Aphis sacchari* was very prevalent. Only 2·12 inches of rain were recorded for the month of December. At this period the plant canes were backward but the ratoons had made fair progress. For the months of January and February, 1926, 22·36 inches of rain were recorded. The canes at the end of February were still backward throughout the district. Good growing conditions existed over the months of March and April, with 15 inches and 11 inches of rain respectively. A change in the weather, however, with a cold snap, set in during the third week in April, and ground temperatures dropped from 62 to 52 Fah. This change brought about early arrowing in a large percentage of crops throughout the district. No further pronounced headway could be noticed in the growth of crops up to the end of May. The mills, however, with fairly large proportions of standover canes, were able to commence crushing in the month of June.

6. Northern Sugar Experiment Station—*continued.*

Abstract of Meteorological Observations made at the Northern Sugar Experiment Station, South Johnstone, from 1st September, 1925, to 31st August, 1926—Covering Period of Growth of Experiment Canes.

Month.	Rainfall in Inches.	Number of Wet Days.	Average Rainfall, 6 Years, 1921–1926.	Highest Shade Maximum.	Lowest Shade Maximum.	Mean Shade Maximum.	Highest Shade Minimum.	Lowest Shade Minimum.	Mean Shade Minimum.	Lowest Terrestrial Minimum.	Mean Terrestrial Minimum.	Mean Diurnal Range.	Mean Temperature, 9 a.m.	Mean Relative Humidity of the Air, 9 a.m.
September, 1925 ..	2·28	8	3·84	92	83	87	67	49	57	42	53	10	70	75
October, 1925 ..	2·16	6	3·2	96	79	86	73	55	60	50	55	26	77	69
November, 1925 ..	3·23	8	3·37	98	88	89	73	61	64	56	59	25	81	67
December, 1925 ..	2·12	6	10·07	102	91	96	76	60	69	59	64	27	88	59
January, 1926 ..	14·1	17	12·6	100	82	95	77	65	72	53	67	23	86	68
February, 1926 ..	8·26	18	19·39	96	83	92	75	67	71	62	66	21	84	71
March, 1926 ..	15·06	28	32·91	94	85	90	75	66	71	61	66	19	84	75
April, 1926 ..	11·58	12	15·49	96	85	87	75	57	65	52	59	22	78	73
May, 1926 ..	·63	7	7·7	95	85	86	71	49	58	44	52	28	72	76
June, 1926 ..	3·02	15	7·08	92	74	81	69	47	61	45	55	20	70	85
July, 1926 ..	2·18	10	3·8	84	71	78	66	42	56	36	51	22	69	80
August, 1926 ..	2·71	10	3·47	88	76	81	67	45	58	40	52	23	71	80
	67·33	145	122·92	..	..	..	..	..	..	..	..	..	..	*73·2

*Average.

EXPERIMENT WORK, 1925-1926.

1. Continuation of experiments with green manures, as follows:—
   - Plot 1—Green manure and mixed fertilisers.
   - Plot 2—Green manure, no fertilisers.
   - Plot 3—No green manure, mixed fertilisers.
   - Plot 4—No green manure, no fertilisers Second ratoon crop (Badila).
2. Distance experiments, second ratoon crop (Badila).
3. Experiments with fertilisers, plant crop (Badila).
4. Preparatory treatment of green manure to be followed by cane:—
   - Plot 1—Land not subsoiled nor fertilised, green manured.
   - Plot 2—Land subsoiled, no fertilisers, green manured.
   - Plot 3—Land not subsoiled but fertilised with 200 lb. meatworks and 100 lb. sulphate of potash per acre; green manured.
   - Plot 4—Land not subsoiled nor fertilised; green manured. First ratoon crop (Badila).
5. Analytical results from new seedling canes.
6. Analyses of varieties.

1. Continuation of Experiments with Green Manures.

Second ratoons (Badila) as under:—

Plot 1—Green manure and mixed fertilisers.

Plot 2—Green manure, no fertilisers.

Plot 3—No green manure, mixed fertilisers.

Plot 4—No green manure, no fertilisers.

This experiment was laid down to seek information as to the benefit of green manuring on this class of soil, and was initiated in 1923. The previous crop was ploughed out in October, 1922, and the land cross-ploughed in November, 1922, when cowpea was sown on Plots 1 and 2 at the rate of one bushel per acre. The resulting crops, which were fair, were ploughed in during January of 1923. This was followed by a further three cross-ploughings.

The plant and first ratoon crop yields have appeared in previous reports, but the crop results to date, which are given further on, also furnish these.

The following notes were made by the Chemist in charge:—

Particulars of mechanical treatment—Experiments with green manures.

1st September, 1925—Burnt off trash after harvesting first ratoon crop.

8th and 9th September—Centres of rows opened and burst, using 12-in. skeleton swing plough twice in row to a depth of 10 inches.

10th September, 1925—Stubbles ratooned (cut away) using 10-in. swing plough to a depth of 9 inches.

1st November, 1925—Applied fertiliser to Plots 1 and 3.

A heavy furrow was thrown back to the cane rows after cutting away in ratooning and harrowing down, the cane rows being slightly hilled up. During growth of cane, the usual fortnightly cultivation of rows was carried out—using a Planet Junior cultivator with broad sweep hoes.

Particulars of growth of plots—Experiments with green manure.

1st March—Plot 1: Growth fair to good, stooling heavy; canes much advanced compared with Plot 2.

1st June—Plot 1: Crop erect, showing excess trash as result of dry weather.

1st March—Plot 2: Growth medium, slight yellowing of leaves.

6. Northern Sugar Experiment Station—*continued.*

1st June—Plot 2: An amount of arrowing developing, no further growth. No appearance of disease; canes much shorter than in Plot 1.

1st March—Plot 3: Growth fair, better than Plots 2 and 4.

1st June—Plot 3: Showing on average 1 foot of cane in excess of Plot 4.

1st March—Plot 4: Growth medium, canes showing slight yellowing of leaves.

1st June—Plot 4: Arrowing developed considerably.

The following tables disclose the analytical and crop results:—

Analytical Results of Experiments with Green Manure and Fertilisers—2nd Ratoon Crop, Badila—September, 1926

Division.	Plot Number.	Variety of Cane.	Treatment.	Age of Cane.	Date of Analysis.	Brix of Juice.	% Sucrose in Juice.	Purity of Juice.	% Fibre.	% Glucose in Juice.	% Sucrose in Cane.	% C.C.S. in Cane.
B1	1	N.G. 15 ..	Green manure. Fertiliser applied:—250 lb. nitrate of soda, 100 lb. sulphate of potash, and 250 lb. basic superphosphate	12 months	7 Sept.	21·9	20·78	94·9	9·4	·29	17·79	17·09
B1	2	N.G. 15 ..	Green manure. No fertiliser	12 months	7 Sept.	23·0	21·99	95·6	9·4	·30	18·82	18·16
B1	3	N.G. 15 ..	No green manure. Fertiliser applied:—250 lb. nitrate of soda, 100 lb. sulphate of potash and 250 lb. basic superphosphate	12 months	7 Sept.	21·9	20·51	93·6	9·4	·43	17·56	16·74
B1	4	N.G. 15 ..	No green manure. No fertiliser	12 months	7 Sept.	23·3	22·21	95·3	9·4	·31	19·01	18·31

Crop Results of Experiments with Green Manure and Fertilisers—2nd Ratoon Crop—N.G. 15 or Badila—September, 1926.

Division.	Plot Number.	Variety of Cane.	Treatment.	Age of Cane.	Yield of Cane per Acre in English Tons.	Total Yield of Sugar per Acre in English Tons.	Total Yield of Commercial Cane Sugar per Acre in English Tons.
B1	1	N.G. 15 or Badila	Green manure. Fertiliser applied:—250 lb. nitrate of soda, 100 lb. sulphate of potash, 250 lb. basic superphosphate per acre	12 months	36·44	6·48	6·23
B1	2	N.G. 15 or Badila	Green manure. No fertiliser applied ..	12 months	27·84	5·24	5·05
B1	3	N.G. 15 or Badila	No green manure. Fertiliser applied:—250 lb. nitrate of soda, 100 lb. sulphate of potash, 250 lb. basic superphosphate per acre	12 months	32·58	5·72	5·45
B1	4	N.G. 15 or Badila	No green manure. No fertiliser applied ..	12 months	25·42	4·83	4·65

The green manures, with fertilisers, have again given a higher yield in the second ratoon crop, while Plot 2, with green manure only, shows a higher yield than Plot 4, with no green manure and no fertilisers.

6. Northern Sugar Experiment Station—*continued.*

Below are given the analytical and crop results to date:—

Analytical Results to Date of Experiments with Green Manure and Fertilisers—N.G. 15 or Badila.

Division.	Plot Number.	Variety of Cane.	Treatment.	% C.C.S. Plant Crop.	% C.C.S. First Ratoon Crop.	% C.C.S. Second Ratoon Crop.	Total Tons C.C.S. Three Crops.	Average C.C.S. Three Crops.
Bl ..	1	N.G. 15 or Badila	Green manure. Fertiliser applied :—250 lb. nitrate of soda, 100 lb. sulphate of potash, 250 lb. basic superphosphate per acre	14·63	15·68	17·09	17·39	15·87
Bl ..	2	N.G. 15 or Badila	Green manure. No fertiliser applied ..	14·81	15·91	18·16	14·56	16·29
Bl ..	3	N.G. 15 or Badila	No green manure. Fertiliser applied :—250 lb. nitrate of soda, 100 lb. sulphate of potash, 250 lb. basic superphosphate per acre	14·1	14·78	16·74	15·63	15·22
Bl ..	4	N.G. 15 or Badila	No green manure. No fertiliser applied ..	14·06	15·14	18·31	13·95	15·73

Crop Results to Date of Experiments with Green Manure and Fertilisers—N.G. 15 or Badila.

Division.	Plot Number.	Variety of Cane.	Treatment.	Plant Crop, 1924—Age 12½ Months.		First Ratoon Crop, 1925—Age 12 Months.		Second Ratoon Crop, 1926—Age 12 Months.		Total Results for Three Crops.		Average for Three Crops.	
				Yield of Cane per Acre in English Tons.	Yield of Commercial Cane Sugar per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of Commercial Cane Sugar per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of Commercial Cane Sugar per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of Commercial Cane Sugar per Acre in English Tons.	Yield of Cane per Acre in English Tons	Yield of Commercial Cane Sugar per Acre in English Tons
Bl	1	N.G. 15 or Badila	Green manure. Fertiliser applied :—250 lb. nitrate of soda, 100 lb. sulphate of potash, 250 lb. basic superphosphate per acre	29·23	4·28	43·87	6·88	36·44	6·23	109·54	17·39	36·51	5·8
Bl	2	N.G. 15 or Badila	Green manure. No fertiliser applied	25·78	3·81	35·79	5·69	27·84	5·05	89·41	14·55	29·8	4·85
Bl	3	N.G. 15 or Badila	No green manure. Fertiliser applied :—250 lb. nitrate of soda, 100 lb. sulphate of potash, 250 lb. basic superphosphate per acre	28·21	3·98	41·95	6·2	32·58	5·45	102·74	15·63	34·25	5·21
Bl	4	N.G. 15 or Badila	No green manure. No fertiliser applied	25·74	3·62	37·53	5·68	25·42	4·65	88·69	13·95	29·56	4·65

The average crop results show that green manures in this case have not given any special results compared with fertilisers. The average crop results for plant, first and second ratoons are satisfactory from a tonnage point of view. This experiment is now concluded.

2. Distance Experiments—Second Ratoon Crop (Badila).

Series No. 1—

Rows 5 feet apart and plants spaced 12 inches—

Plants per acre 5,090

Eyes per acre 18,230

Rows 6 feet apart and plants spaced 12 inches—

Plants per acre 4,200

Eyes per acre 15,060

Rows 7 feet apart and plants spaced 12 inches—

Plants per acre 3,608

Eyes per acre 12,938

Series No. 2—

Rows 5 feet apart and plants spaced 6 inches—

Plants per acre 6,640

Eyes per acre 20,938

Rows 5 feet apart and plants spaced 12 inches—

Plants per acre 4,910

Eyes per acre 18,410

6. Northern Sugar Experiment Station—*continued.*

Rows 5 feet apart and plants spaced 2 feet—

Plants per acre 3,177
Eyes per acre 9,710

Series No. 3—

Rows 7 feet apart and plants spaced 36 inches—

Plants per acre 1,675
Eyes per acre 5,386

Confirmation of previous experiments carried out at the Mackay Sugar Experiment Station some years ago was sought on the South Johnstone lands.

The results of the plant and first ratoon crops have already been published in the two preceding reports.

The following notes were made by the chemist in charge of the station:—

Notes on mechanical treatment—Distance experiments.

17th September, 1925—Burnt off trash after harvesting from ratoon crop.

25th September, 1925—Centres of rows opened and burst, using 12-in. skeleton swing plough twice in row to a depth of 10 inches.

5th October, 1925—Stubbles ratooned (cut away) using 10-in. swing plough to a depth of 9 inches.

12th November, 1925—Applied fertiliser to all plots.

A heavy furrow was thrown back to cane rows after cutting away in ratooning and harrowing down, the cane rows being slightly hilled up. During growth of cane, the usual fortnightly cultivation of rows was carried out, using a Planet Junior cultivator with broad sweep hoes.

Particulars of growth of plots—Distance experiments.

First Series—

1st March—Plot 1: Even growth; fairly advanced canes; no difference noticeable compared with Plots 2 and 3.

1st June—Plot 1: No fallen canes; no disease noticeable.

1st March—Plot 2: Even growth over plot; advanced canes.

1st June—Plot 2: Canes healthy and erect.

1st March—Plot 3: Even growth over plot; advanced canes.

1st June—Plot 3: No difference in growth noticeable compared with Plots 1 and 2.

Second Series—

1st March—Plot 1: Even growth; no difference noticeable compared with Plots 1, 2, and 3 of first series.

1st June—Plot 1: Compares evenly in growth with first series.

1st March—Plot 2: Even growth over plot; slightly better than Plot 1.

1st June—Plot 2: Appeared heavier crop than Plot 1; canes erect.

1st March—Plot 3: Even growth over plot; compares with Plot 2.

1st June—Plot 3: Canes healthy and erect.

Third Series—

1st March—Plot 1: Even growth over plot; advanced growth with heavy stools.

1st June—Plot 1: Canes of sound, heavy stools; little difference in length noticeable compared with other plots in division.

The tables appearing below give the analytical and crop results:—

Analytical Results of Experiments in Distance Plantings, using the Variety N.G. 15 or Badila—2nd Ratoon Crop—September, 1926.

Division.	Plot Number.	Variety of Cane.	Treatment.	Age of Cane.	Date of Analysis.	Brix of Juice.	% Sucrose in Juice.	Purity of Juice.	% Fibre.	% Glucose in Juice.	% Sucrose in Cane.	% C.C.S. in Cane.
First Series, Plants 12 inches apart.												
A2	1	N.G. 15 ..	Rows 5 feet apart and plants spaced 12 inches Plants per acre, 5,090 Eyes per acre, 18,230	12 months	21 Sep.	20·3	19·26	94·9	9·4	·30	16·49	15·84
A2	2	N.G. 15 ..	Rows 6 feet apart and plants spaced 12 inches Plants per acre, 4,200 Eyes per acre, 15,060.	12 months	21 Sep.	21·3	20·22	94·9	9·4	·31	17·31	16·63
A2	3	N.G. 15 ..	Rows 7 feet apart and plants spaced 12 inches Plants per acre, 3,608. Eyes per acre, 12,938.	12 months	21 Sep.	20·9	19·57	93·6	9·4	·36	16·75	15·97

6. Northern Sugar Experiment Station—*continued.*

Analytical Results of Experiments in Distance Plantings, using the Variety N.G. 15 or Badila—2nd Ratoon Crop—September, 1926—*continued.*

Division.	Plot Number.	Variety of Cane.	Treatment.	Age of Cane.	Date of Analysis.	Brix of Juice	% Sucrose in Juice.	Purity of Juice.	% Fibre.	% Glucose in Juice.	% Sucrose in Cane.	% C.C.S. in Cane.
			Second Series, Rows 5 feet apart.									
A2	1	N.G. 15 ..	Rows 5 feet apart and plants spaced 6 inches Plants per acre, 6,640. Eyes per acre, 20,938.	12 months	21 Sep.	21·1	19·81	93·9	9·4	·35	16·96	16·19
A2	2	N.G. 15 ..	Rows 5 feet apart and plants spaced 12 inches Plants per acre, 4,910. Eyes per acre, 18,410.	12 months	21 Sep.	21·4	20·09	93·9	9·4	·37	17·20	16·42
A2	3	N.G. 15 ..	Rows 5 feet apart and plants spaced 2 feet Plants per acre, 3,177. Eyes per acre, 9,710.	12 months	21 Sep.	21·3	19·98	93·8	9·4	·35	17·10	16·32
			Third Series, Rows 7 feet apart, Plants 3 feet apart.									
A2	1	N.G. 15 ..	Rows 7 feet apart and plants spaced 36 inches Plants per acre, 1,675. Eyes per acre, 5,386.	12 months	21 Sep.	20·8	19·42	93·3	9·4	·37	16·62	15·82

Crop Results of Experiments in Distance Plantings, using the Variety N.G. 15 or Badila—2nd Ratoon Crop—September, 1926.

Division.	Plot Number.	Method of Planting.	Age of Cane.	Yield of Cane per Acre in English Tons.	Total Yield of Sugar per Acre in English Tons.	Total Yield of Commercial Cane Sugar per Acre in English Tons.
		First Series, Plants 12 inches apart.				
A2	1	Rows 5 feet apart and plants spaced 12 inches .. .. Plants per acre, 5,090. Eyes per acre, 18,230.	12 months	39·3	6·48	6·22
A2	2	Rows 6 feet apart and plants spaced 12 inches .. .. Plants per acre, 4,200. Eyes per acre, 15,060.	12 months	44·26	7·66	7·36
A2	3	Rows 7 feet apart and plants spaced 12 inches .. .. Plants per acre, 3,608. Eyes per acre, 12,938.	12 months	42·88	7·18	6·85
		Second Series, Rows 5 feet apart.				
A2	1	Rows 5 feet apart and plants spaced 6 inches .. .. Plants per acre, 6,640. Eyes per acre, 20,938.	12 months	42·49	7·21	6·88
A2	2	Rows 5 feet apart and plants spaced 12 inches .. .. Plants per acre, 4,910. Eyes per acre, 18,410.	12 months	46·62	8·02	7·65
A2	3	Rows 5 feet apart and plants spaced 2 feet .. .. Plants per acre, 3,177. Eyes per acre, 9.710.	12 months	43·93	7·51	7·17
		Third Series, Rows 7 feet apart, Plants 36 inches apart.				
A2	1	Rows 7 feet apart and plants spaced 36 inches .. .. Plants per acre, 1,675. Eyes per acre, 5,386.	12 months	40·46	6·72	6·4

6. Northern Sugar Experiment Station—*continued.*

The crop results this year in the second ratoons are much the same as in last year's crop of first ratoons, and appear to indicate that a slightly wider distance between the plants may be more advantageous than at Mackay. Below are given the analytical and crop results to date.

Analytical Results to Date of Experiments in Distance Plantings, using the Variety N.G. 15 or Badila.

Division.	Plot Number.	Method of Planting.	% C.C.S. Plant Crop.	% C.C.S. First Ratoon Crop.	% C.C.S. Second Ratoon Crop.	Total Tons C.C.S.—Three Crops.	Average C.C.S.—Three Crops.
		First Series, Plants 12 inches apart.					
A2	1	Rows 5 feet apart and plants spaced 12 inches.. Plants per acre, 5,090. Eyes per acre, 18,230.	14·4	15·03	15·84	18·46	15·08
A2	2	Rows 6 feet apart and plants spaced 12 inches.. Plants per acre, 4,200. Eyes per acre, 15,060.	14·54	14·26	16·63	19·16	15·17
A2	3	Rows 7 feet apart and plants spaced 12 inches.. Plants per acre, 3,608. Eyes per acre, 12,938.	14·2	14·1	15·97	18·04	14·79
		Second Series, Rows 5 feet apart.					
A2	1	Rows 5 feet apart and plants spaced 6 inches .. Plants per acre, 6,640. Eyes per acre, 20,938.	14·52	15·31	16·19	19·88	15·35
A2	2	Rows 5 feet apart and plants spaced 12 inches.. Plants per acre, 4.910. Eyes per acre, 18,410.	14·52	16·64	16·42	20·86	15·97
A2	3	Rows 5 feet apart and plants spaced 2 feet .. Plants per acre, 3,177. Eyes per acre, 9,710.	14·6	15·19	16·32	18·64	15·44
		Third Series, Rows 7 feet apart, Plants 3 feet apart.					
A2	1	Rows 7 feet apart and plants spaced 36 inches.. Plants per acre, 1,675. Eyes per acre, 5,386.	15·19	14·44	15·82	17·31	15·13

Crop Results to Date of Experiments in Distance Plantings, using the Variety N.G. 15 or Badila.

Division.	Plot Number.	Method of Planting.	Plant Crop, 1924. Age 13 Months.		First Ratoon, 1925. Age 12 Months		Second Ratoon, 1926. Age 12 Months.		Total Results for Three Crops.		Average for Three Crops.	
			Yield of Cane per acre in English Tons.	Yield of Commercial Cane Sugar per acre in English Tons.	Yield of Cane per acre in English Tons.	Yield of Commercial Cane Sugar per acre in English Tons.	Yield of Cane per acre in English Tons.	Yield of Commercial Cane Sugar per acre in English Tons.	Yield of Cane per acre in English Tons.	Yield of Commercial Cane Sugar per acre in English Tons.	Yield of Cane per acre in English Tons.	Yield of Commercial Cane Sugar per acre in English Tons.
		First Series, Plants 12 inches apart.										
A2	1	Rows 5 feet apart and plants spaced 12 inches Plants per acre, 5,090. Eyes per acre, 18,230.	41·23	5·94	41·95	6·3	39·3	6·22	122·48	18·46	40·83	6·15
A2	2	Rows 6 feet apart and plants spaced 12 inches Plants per acre, 4,200. Eyes per acre, 15,060.	37·31	5·42	44·67	6·37	44·26	7·36	126·24	19·15	42·08	6·38
A2	3	Rows 7 feet apart and plants spaced 12 inches Plants per acre, 3,608. Eyes per acre, 12,938.	37·46	5·32	41·62	5·86	42·88	6·85	121·96	18·03	40·65	6·01

6. Northern Sugar Experiment Station—*continued.*

Crop Results to Date of Experiments in Distance Plantings, using the Variety N.G. 15 or Badila—*continued.*

Division.	Plot Number.	Method of Planting.	Plant Crop, 1924—Age 13 Months.		First Ratoon, 1925—Age 12 Months.		Second Ratoon, 1926—Age 12 Months.		Total Results for Three Crops.		Average for Three Crops.	
			Yield of Cane per Acre in English Tons.	Yield of Commercial Cane Sugar per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of Commercial Cane Sugar per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of Commercial Cane Sugar per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of Commercial Cane Sugar per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of Commercial Cane Sugar per Acre in English Tons.
Second Series, Rows 5 feet apart.												
A2	1	Rows 5 feet apart and plants spaced 6 inches Plants per acre, 6,640. Eyes per acre, 20,938.	40·15	5·83	46·9	7·18	42·49	6·88	129·54	19·89	43·18	6·63
A2	2	Rows 5 feet apart and plants spaced 12 inches Plants per acre, 4,910. Eyes per acre, 18,410.	36·37	5·28	47·7	7·94	46·62	7·65	130·69	20·87	43·56	6·96
A2	3	Rows 5 feet apart and plants spaced 2 feet Plants per acre, 3,177. Eyes per acre, 9,710.	32·49	4·74	44·28	6·73	43·93	7·17	120·7	18·64	40·23	6·21
Third Series, 7 feet apart, Plants 36 inches apart.												
A2	1	Rows 7 feet apart and plants spaced 36 inches Plants per acre, 1,675. Eyes per acre, 5,386.	31·22	4·74	42·68	6·16	40·46	6·4	114·36	17·3	38·12	5·77

From the average results from the plant, first and second ratoon crops, it will be gathered that planting in drills 5 feet apart with 12 inches between the sets in the drill has given the best results, though these are not far in front of Plot 1, second series, when the plants were placed 6 inches apart in 5-foot rows. The differences in all the plots are not nearly so marked as they were in similar experiments carried out at the Mackay Experiment Station, where close planting gave the highest yields. It is evident, however, from these trials that fairly close planting can still be recommended—i.e., the width of drills should not exceed 5 to 6 feet, nor the distance between plants be more than 6 to 12 inches. The variation in distance between the rows has not produced such wide differences in tonnages as in previous experiments. Particulars as to the Mackay experiments will be found in Bulletin No. 4, General Series of this Bureau. It is there stated that in the North, with its heavy rainfalls and moist humid conditions, thick planting may not be at all advisable, yet, as the above South Johnstone trials show, planting should not be too wide.

3. Fertilising Experiment.

To be treated as follows:—

Plot 1—500 lb. basic superphosphate per acre.

Plot 2—500 lb. meatworks per acre.

Plot 3—Mixed manure, containing 200 lb. nitrate of soda, 100 lb. sulphate of potash, and 200 lb. basic superphosphate per acre.

Plot 4—No manure.

Plot 5—Sulphate of potash, 500 lb. per acre.

Plot 6—Sulphate of ammonia, 250 lb., and nitrate of soda 250 lb., per acre.

The object of the above experiment was to test the action of mixed manures as against single fertilisers such as nitrogen, potash, and phosphoric acid.

The land was thoroughly prepared by four ploughings and green manuring.

13th and 14th August, 1925—Planted up plots. Seed used, 8 months' plant cane; variety, Badila (N.G. 15); plants spaced 6 inches and hand planted.

6th and 7th November, 1925—Applied fertilisers.

Particulars of Growth of Plots, B4 Division.

1st March—Plot 1: Canes even in growth over plot; rate of growth slow.

1st June—Plot 1: Canes of healthy appearance; stools showing 3 feet to 3 feet 6 inches of cane.

1st March—Plot 2: No difference in growth noted compared with Plot 1.

1st June—Plot 2: Canes healthy and even over plot; similar in growth to Plot 1.

1st March—Plot 3: Growth showed an even appearance when compared with Plots 1 and 2.

1st June—Plot 3: Canes of sound stools; no difference in length noticeable when compared with Plots 1 and 2.

1st March—Plot 4: Canes appeared equal in growth when compared with Plots 1, 2, and 3.

1st June—Plot 4: Canes of medium thickness; stools showing 3 feet of stalk.

1st March—Plot 5: Canes appeared slightly superior in growth when compared with all plots in division.

6. Northern Sugar Experiment Station—*continued.*

1st June—Plot 5: Stools appeared to have heavier canes than other plots.

1st March—Plot 6: Canes were slightly inferior to Plot 5; improved appearance compared with Plots 1, 2, 3, and 4.

1st June—Plot 6: Stools showing about 4 feet of cane.

The analytical and crop results are furnished in the tables below:—

Analytical Results of Plots in Fertiliser Experiments, N.G. 15 or Badila—Plant Crop—September, 1926.

Division.	Plot Number.	Variety of Cane.	Treatment.	Age of Cane.	Date of Analysis.	Brix of Juice.	% Sucrose in Juice.	Purity of Juice.	% Fibre.	% Glucose in Juice.	% Sucrose in Cane	% C.C.S. in Cane.
B4	1	N.G. 15 ..	Fertiliser applied as follows:—500 lb. basic superphosphate per acre	12 months	2 Sep.	23·1	21·97	95·1	9·4	·27	18·81	18·09
B4	2	N.G. 15 ..	Fertiliser applied as follows:—500 lb. meatworks per acre	12 months	2 Sep.	22·1	20·33	92·0	9·4	·60	17·40	16·42
B4	3	N.G. 15 ..	Fertiliser applied as follows:—200 lb. nitrate of soda, 100 lb. sulphate of potash, and 200 lb. basic superphosphate	12 months	2 Sep.	22·9	20·80	90·8	9·4	·29	17·80	16·68
B4	4	N.G. 15 ..	No manure	12 months	2 Sep.	21·9	20·27	92·5	9·4	·43	17·35	16·43
B4	5	N.G. 15 ..	Fertiliser applied as follows:—500 lb. sulphate of potash per acre	12 months	2 Sep.	22·4	20·93	93·4	9·4	·39	17·92	17·06
B4	6	N.G. 15 ..	Fertiliser applied as follows:—250 lb. sulphate of ammonia and 250 lb. nitrate of soda per acre	12 months	2 Sep.	22·5	21·00	93·3	9·4	·38	17·98	17·11

Crop Results of Plots in Fertiliser Experiments, N.G. 15 or Badila—Plant Crop—September, 1926.

Division.	Plot Number.	Variety of Cane.	Treatment.	Age of Cane.	Yield of Cane per Acre in English Tons.	Total Yield of Sugar per Acre in English Tons.	Yield of Commercial Cane Sugar per Acre in English Tons.
B4	1	N.G. 15 ..	Fertiliser applied as follows:—500 lb. basic superphosphate per acre	12 months	41·59	7·82	7·52
B4	2	N.G. 15 ..	Fertiliser applied as follows:—500 lb. meatworks per acre	12 months	42·94	7·47	7·05
B4	3	N.G. 15 ..	Fertiliser applied as follows:—200 lb. nitrate of soda, 100 lb. sulphate of potash, and 200 lb. basic superphosphate	12 months	39·54	7·04	6·59
B4	4	N.G. 15 ..	No manure	12 months	42·72	7·41	7·02
B4	5	N.G. 15 ..	Fertiliser applied as follows:—500 lb. sulphate of potash per acre	12 months	43·51	7·80	7·42
B4	6	N.G. 15 ..	Fertiliser applied as follows:—250 lb. sulphate of ammonia and 250 lb. nitrate of soda per acre	12 months	41·24	7·41	7·06

In the plant crop practically no returns have been shown from the different fertilisers used, but it is expected that the manures will increase the yields in the succeeding ratoon crops. Owing to the green manure and preparation of the cane for a plant crop it has frequently happened that little or no advantage has resulted from fertilisers.

4. Preparatory Treatment of Green Manure, followed by Cane.

(*a*) Land not subsoiled or fertilised; green manured.

(*b*) Land subsoiled; no fertiliser; green manured.

6. Northern Sugar Experiment Station—*continued.*

(*c*) Land not subsoiled but fertilised with 200 lb. meatworks and 100 lb. sulphate of potash per acre; green manured.

(*d*) Land not subsoiled or fertilised; green manured.

First Ratoon Crop—N.G. 15 (Badila).

The piece of land chosen for this experiment was ploughed and cross-ploughed four times. At the time of the final ploughing just before the sowing of the green manure seed, Plot 2 was subsoiled and Plot 3 was fertilised with a mixture of 200 lb. of meatworks and 100 lb. sulphate of potash per acre.

After ploughing in the green crop, the variety known as N.G. 15 or Badila was planted, and the results of the plant crop appeared in last year's report.

The following was the treatment of the first ratoon crop:—

30th September, 1925—Burnt off trash after harvesting plant crop.

15th October, 1925—Centres of rows opened and burst, using 12-inch skeleton swing plough twice in row to a depth of 10 inches.

19th October, 1925—Stubbles ratooned (cut away), using 10-inch swing plough to a depth of 9 inches.

9th November, 1925—Applied fertiliser in four plots.

A heavy furrow was thrown back to the cane rows after cutting away in ratooning, followed by harrowing down, the cane rows being slightly hilled up. During growth of cane, the usual fortnightly cultivation of rows was carried out, using a Planet Junior cultivator with broad sweep hoes.

Particulars of Growth of Plots.

1st March.—Plot 1: Growth rapid, heavy stooling, canes of a healthy dark green.

1st June.—Plot 1: Canes 4 feet 9 inches to 5 feet in stalk; plot even in growth.

1st March.—Plot 2: Good even growth, no difference noticeable compared with Plot 1.

1st June.—Plot 2: Plot showing sound healthy canes.

1st March.—Plot 3: Canes similar in growth to Plots 1 and 2.

1st June.—Plot 3: Plot improved in growth compared with Plot 4.

1st March.—Plot 4: No difference in growth noticeable when compared with Plots 1, 2, and 3.

1st June.—Plot 4: Advanced canes, but appeared slightly inferior in length when compared with Plots 1, 2, and 3.

The following are the Analytical and Crop Result tables:—

Analytical Results to Date of Preparatory Treatment of Land for Green Manure followed by Cane—N.G. 15 or Badila—First Ratoon Crop—September, 1926.

Division.	Plot Number.	Variety of Cane.	Treatment.	% C.C.S. Plant Crop.	% C.C.S. First Ratoon.	Total Tons C.C.S. Two Crops.	Average C.C.S. Two Crops.
B2	1	N.G. 15 or Badila	Green manured. Not subsoiled. No fertiliser plant crop	13·31	16·42	12·97	14·91
B2	2	N.G. 15 or Badila	Green manured. Subsoiled. No fertiliser plant crop	9·87	15·61	11·22	12·79
B2	3	N.G. 15 or Badila	Green manured. Not subsoiled. Fertiliser of following mixture applied to plot previous to sowing of green manure. Fertiliser:—200 lb. meatworks and 100 lb. sulphate of potash per acre	14·3	16·59	13·34	15·44
B2	4	N.G. 15 or Badila	Green manured. Not subsoiled. No fertiliser plant crop	15·93	16·89	13·72	16·42

Crop Results of Preparatory Treatment of Land for Green Manure followed by Cane—N.G. 15 or Badila—1st Ratoon Crop—September, 1926.

Division.	Plot Number.	Variety of Cane.	Treatment.	Age of Cane.	Yield of Cane per Acre in English Tons.	Yield of Sugar per Acre in English Tons.	Yield of Commercial Cane Sugar per Acre in English Tons.
B2	1	N.G. 15 or Badila	Green manured. Not subsoiled. No fertiliser plant crop	12 months	44·88	7·73	7·37
B2	2	N.G. 15 or Badila	Green manured. Subsoiled. No fertiliser plant crop	12 months	44·65	7·36	6.97
B2	3	N.G. 15 or Badila	Green manured. Not subsoiled. Fertiliser of following mixture applied to plot previous to sowing of green manure. Fertiliser:—200 lb. meatworks and 100 lb. sulphate of potash per acre	12 months	42·93	7·46	7·12
B2	4	N.G. 15 or Badila	Green manured. Not subsoiled. No fertiliser plant crop.	12 months	42·7	7·55	7·21

6. Northern Sugar Experiment Station—*continued.*

Analytical Results of Preparatory Treatment of Land for Green Manure followed by Cane—1st Ratoon Crop—N.G 15 or Badila.

Division.	Plot Number.	Variety of Cane.	Treatment.	Age of Cane.	Date of Analysis.	Brix of Juice.	% Sucrose in Juice.	Purity of Juice.	% Fibre.	% Glucose in Juice.	% Sucrose in Cane.	% C.C.S. in Cane.
B2	1	N.G. 15 ..	Green manured. Not subsoiled. No fertiliser plant crop. First ratoon crop fertiliser applied	12 months	13 Sep.	21·5	20·12	93·6	9·4	·37	17·22	16·42
B2	2	N.G. 15 ..	Green manured. Subsoiled. No fertiliser plant crop. First ratoon crop fertiliser applied	12 months	13 Sep.	20·8	19·25	92·5	9·4	·45	16·48	15·61
B2	3	N.G. 15 ..	Not subsoiled. Fertiliser of following mixture applied to plot previous to sowing of green manure. Fertiliser 200 lb. meatworks and 100 lb. sulphate of potash per acre. First ratoon crop fertiliser applied	12 months	13 Sep.	21·7	20·32	93·6	9·4	·33	17·39	16·59
B2	4	N.G. 15 ..	Green manured. Not subsoiled. No fertiliser plant crop. First ratoon crop fertiliser applied	12 months	13 Sep.	22·0	20·66	93·9	9·4	·32	17·68	16·89

Crop Results to Date of Preparatory Treatment of Land for Green Manure followed by Cane—N.G. 15 or Badila.

Division.	Plot Number.	Variety of Cane.	Treatment.	Plant Crop, 1925—Age 14 Months.		First Ratoon Crop, 1926—Age 12 Months.		Average for Two Crops.	
				Yield of Cane per Acre in English Tons.	Yield of Commercial Cane Sugar per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of Commercial Cane Sugar per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of Commercial Cane Sugar per Acre in English Tons.
B2..	1	N.G. 15 or Badila	Green manured. Not subsoiled. No fertiliser. Plant crop	42·11	5·6	44·88	7·37	43·49	6·48
B2..	2	N.G. 15 or Badila	Green manured. Subsoiled. No fertiliser to plant crop	43·02	4·25	44·65	6·97	43·83	5·61
B2..	3	N.G. 15 or Badila	Green manured. Not subsoiled. Fertiliser of following mixture applied to plot previous to sowing of green manure. 200 lb. meatworks and 100 lb. sulphate of potash per acre	43·52	6·22	42·93	7·12	43·27	6·67
B2..	4	N.G. 15 or Badila	Green manured. Not subsoiled. No fertiliser to plant crop	40.88	6·51	42·7	7·21	41·79	6·86

Note.—A mixed fertiliser consisting of nitrate of soda 100 lb., sulphate of ammonia 100 lb., sulphate of potash 100 lb., and meatworks, 200 lb. per acre, was applied to the first ratoon crop.

Comparatively little difference is shown between the plots in the average crop results.

5. Analytical Results from New Seedling Canes.

Owing to replanting the seedlings shown in the following table the analyses had to be carried out earlier in the year. In consequence the commercial cane sugar is not so high as it otherwise would have been. The tables embrace 1921 and 1922 seedlings. Some of the 1921 seedling canes are of much promise. Ten of these sent to Mackay show fine analytical results, as will be seen from the tables given in the Mackay section of the report.

6. Northern Sugar Experiment Station—*continued.*

Analyses of 1921 Seedling Varieties Selected for Replanting—1st Ratoon—1926.

Seedling Number.	Month of Analysis.	Age of Cane.	Brix of Juice.	% Sucrose in Juice.	Purity of Juice.	% Sucrose in Cane	% C.C.S. in Cane.	Variety from which Seed was taken.
S.J.Q. 1 ..	July	10 months	18·3	14·7	80·3	12·49	10·8	N.G. 15 (Badila)
S.J.Q. 2 ..	July	10 months	21·2	20·03	94·5	17·02	16·3	N.G. 15 (Badila)
S.J.Q. 3 ..	July	10 months	21·0	19·42	92·5	16·51	15·6	N.G. 15 (Badila)
S.J.Q. 4 ..	July	10 months	18·9	16·11	85·2	13·69	12·3	N.G. 15 (Badila)
S.J.Q. 5 ..	July	10 months	19·9	17·63	88·6	14·98	13·8	N.G. 15 (Badila)
S.J.Q. 7 ..	July	10 months	20·1	18·71	93·1	15·9	15·1	N.G. 15 (Badila)
S.J.Q. 9 ..	July	10 months	17·4	13·99	80·4	11·89	10·3	N.G. 15 (Badila)
S.J.Q. 10 ..	July	10 months	15·7	13·36	85·1	11·36	10·2	N.G. 15 (Badila)
S.J.Q. 12 ..	July	10 months	18·6	15·85	85·2	13·47	12·1	N.G. 15 (Badila)
S.J.Q. 15 ..	July	10 months	20·6	19·2	93·2	16·32	15·5	N.G. 15 (Badila)
S.J.Q. 16 ..	July	10 months	18·7	17·03	91·1	14·47	13·6	N.G. 15 (Badila)
S.J.Q. 17 ..	July	10 months	19·1	16·71	87·5	14·2	13·0	N.G. 15 (Badila)
S.J.Q. 19 ..	July	10 months	17·8	14·23	79·9	12·09	10·4	N.G. 15 (Badila)
S.J.Q. 20 ..	July	10 months	17·9	15·16	84·7	12·89	11·5	N.G. 15 (Badila)
S.J.Q. 21 ..	July	10 months	20·0	17·47	87·3	14·85	13·4	N.G. 15 (Badila)
S.J.Q. 25 ..	July	10 months	19·1	16·2	84·8	13·77	12·3	N.G. 15 (Badila)
S.J.Q. 26 ..	July	10 months	19·1	16·35	85·6	13·9	12·5	N.G. 24 (Goru)
S.J.Q. 28 ..	July	10 months	17·9	15·32	85·6	13·02	11·7	N.G. 24 (Goru)
S.J.Q. 31 ..	July	10 months	15·6	12·47	79·9	10·6	9·1	Q. 903
S.J.Q. 41 ..	July	10 months	19·7	17·15	87·0	14·58	13·3	N.G. 16
S.J.Q. 44 ..	July	10 months	19·5	16·7	85·6	14·19	12·8	N.G. 16
S.J.Q. 45 ..	July	10 months	18·8	15·18	80·7	12·9	11·2	H.Q. 77
S.J.Q. 46 ..	July	10 months	16·4	12·88	78·5	10·95	9·3	H.Q. 77
S.J.Q. 48 ..	July	10 months	18·2	13·79	75·8	11·72	9·7	H.Q. 77
S.J.Q. 49 ..	July	10 months	19·9	17·85	89·7	15·17	14·1	H.Q. 77
S.J.Q. 51 ..	July	10 months	17·6	14·47	82·2	12·3	10·8	H.Q. 77
S.J.Q. 53 ..	July	10 months	18·7	15·48	82·8	13·16	11·6	H.Q. 77
S.J.Q. 54 ..	July	10 months	16·2	13·49	83·3	11·47	10·15	E.K. 28
S.J.Q. 55 ..	July	10 months	20·3	18·55	91·4	15·77	14·8	E.K. 28
S.J.Q. 58 ..	July	10 months	17·6	15·14	86·0	12·87	11·6	H. 109
S.J.Q. 60 ..	July	10 months	19·1	17·39	91·0	14·78	13·9	H. 109
S.J.Q. 64 ..	July	10 months	18·5	14·28	77·2	12·14	10·2	N.G. 15 (Badila)
S.J.Q. 70 ..	July	10 months	19·1	17·82	93·3	15·15	14·4	N.G. 15 (Badila)
S.J.Q. 77 ..	July	10 months	19·1	16·26	85·1	13·82	12·4	N.G. 15 (Badila)
S.J.Q. 91 ..	July	10 months	18·9	16·63	88·0	14·13	13·0	Q. 903
S.J.Q. 112 ..	July	10 months	19·8	17·23	87·0	14·64	13·35	N.G. 16
S.J.Q. 137 ..	July	10 months	19·7	17·33	88·0	14·73	13·5	H.Q. 77
S.J.Q. 174 ..	July	10 months	17·1	13·91	81·3	11·82	10·3	E.K. 28

Analyses of 1921 Seedling Varieties, 1926—Plant Cane.

S.J.Q. 2 ..	August ..	12 months	23·1	21·76	94·2	18·5	17·7	N.G. 15 (Badila)
S.J.Q. 3 ..	August ..	12 months	22·4	20·81	92·9	17·69	16·8	N.G. 15 (Badila)
S.J.Q. 4 ..	August ..	12 months	21·2	19·02	89·7	16·17	15·0	N.G. 15 (Badila
S.J.Q. 5 ..	August ..	12 months	21·1	18·92	89·7	16·08	14·9	N.G. 15 (Badila)
S.J.Q. 7 ..	August ..	12 months	21·3	19·64	92·2	16·69	15·8	N.G. 15 (Badila)
S.J.Q. 15 ..	August ..	12 months	22·6	20·64	91·3	17·54	16·5	N.G. 15 (Badila)
S.J.Q. 16 ..	August ..	12 months	21·4	19·96	93·3	16·97	16·1	N.G. 15 (Badila)
S.J.Q. 17 ..	August ..	12 months	21·0	18·41	87·7	15·65	14·3	N.G. 15 (Badila)
S.J.Q. 26 ..	August ..	12 months	19·4	17·13	88·3	14·56	13·4	N.G. 24 (Goru)
S.J.Q. 28 ..	August ..	12 months	20·0	18·08	90·4	15·37	14·35	N.G. 24 (Goru)
S.J.Q. 33 ..	August ..	12 months	19·8	16·97	85·7	14·42	13·0	Q. 903
S.J.Q. 45 ..	August ..	12 months	19·6	16·34	83·4	13·89	12·3	H.Q. 77
S.J.Q. 49 ..	August ..	12 months	22·2	20·59	92·7	17·5	16·6	H.Q. 77
S.J.Q. 55 ..	August ..	12 months	20·5	18·96	92·5	16·12	15·25	E.K. 28
S.J.Q. 60 ..	August ..	12 months	20·7	19·2	92·7	16·32	15·5	H. 109
S.J.Q. 63 ..	August ..	12 months	19·3	16·77	86·9	14·25	13·0	N.G. 15 (Badila)
S.J.Q. 70 ..	August ..	12 months	19·6	18·08	92·2	15·37	14·5	N.G. 15 (Badila)
S.J.Q. 137 ..	August ..	12 months	22·2	20·11	90·6	17·09	16·0	H.Q. 77

Analyses of 1922 Seedling Varieties, 1926—Plant Cane.

Seedling Number.	Month of Analysis.	Age of Cane.	Brix of Juice	% Sucrose in Juice.	Purity of Juice	% Sucrose in Cane.	% C.C.S. in Cane.	Variety from which Seed was taken.
S.J.Q. 301 ..	August ..	12 months	19·8	17·59	88·8	14·95	13·8	Q. 903
S.J.Q. 319 ..	August ..	12 months	20·0	17·44	87·2	14·82	13·5	N.G. 102
S.J.Q. 344 ..	August ..	12 months	20·5	18·12	88·4	15·4	14·2	7 R. 428 (Pompey)
S.J.Q. 468 ..	August ..	12 months	20·7	18·55	89·6	15·77	14·6	N.G. 24 (Goru)

Analyses of 1922 Seedling Varieties 1926—1st Ratoon.

S.J.Q. 301 ..	July	9 months	19·0	16·37	86·1	13·91	12·6	Q. 903
S.J.Q. 312 ..	July	9 months	19·6	17·23	87·9	14·64	13·4	N.G. 102
S.J.Q. 318 ..	July	9 months	19·2	16·55	86·2	14·07	12·7	N.G. 102
S.J.Q. 319 ..	July	9 months	18·7	15·92	85·1	13·53	12·2	N.G. 102
S.J.Q. 329 ..	July	9 months	19·5	16·86	86·5	14·33	13·0	N.G. 102
S.J.Q. 344 ..	July	9 months	20·3	18·26	89·9	15·52	14·45	7 R. 428 (Pompey)

6. Northern Sugar Experiment Station—*continued.*

6. Analyses of Varieties of Cane on the South Johnstone Experiment Station.

NOTES ON VARIETIES, SEASON 1925-1926.

The variety canes, comprising first ratoons, gave a yield of 32·5 tons of cane per acre. The canes had fallen a good deal by the time of harvesting and this reduced the yield considerably.

Of the older varieties, the canes that continue to do well are Q. 813, E.K. 28, Oba Badila, H.Q. 426 (Clark's seedling), and the Goru canes. The cane H.Q. 458 is erratic in stooling, but gives a fair return of medium density. The Mowbray seedling (M.Q. 1) shows little promise of being of commercial value. This cane gave good results in the first two years' plantings but has declined in vigour the last three years.

Of the later-introduced Mauritius canes, the varieties R.P. 6 and R.P. 8 are superior in growth. These canes gave a density at 13 months' growth of 15·5 per cent. and 12·5 per cent. c.c.s. respectively. The cane R.P. 8 has an appearance much resembling D. 1135. It is an erect-growing cane with a sturdy stubble and good foliage. Although the density of this cane is slightly on the low side, its present yield and manner of growth appear promising.

Analyses of Varieties—Plant Cane.

Name of Variety.	Age of Cane.	Brix of Juice.	% Sucrose in Juice.	Purity of Juice.	% Sucrose in Cane.	% Fibre.	% C.C.S. in Cane.
Tableland Badila	12 months	21·4	19·72	92·1	16·96	9·0	16·02
R.P. 6	13 months	21·0	19·66	93·6	16·36	11·8	15·59
Malabar	12 months	20·9	18·29	87·5	15·36	11·0	14·06
H.Q. 458	12 months	19·9	17·73	89·1	15·07	10·0	13·9
M. 64/14	13 months	20·5	18·19	88·7	15·1	12·0	13·68
M. 291/08	13 months	20·3	17·9	88·2	14·75	12·6	13·56
M. 33/95	13 months	18·5	16·65	90·0	14·03	10·7	13·07
D. 1135	12 months	18·7	15·99	85·5	13·27	12·0	12·25
R.P. 8	13 months	19·1	16·74	87·6	13·64	13·5	12·49
Uba	12 months	19·5	16·85	86·4	13·65	14·0	12·38
M. 55/453	13 months	17·8	14·87	83·5	12·49	11·0	11·08
M. 131/126	13 months	14·2	10·1	71·1	8·48	11·0	6·62

DATES OF ARROWING—VARIETIES—1926.

D. 1135	2nd May
Uba	5th May
M. 33/95	9th May
H.Q. 458	1st June
M. 64/14	2nd June
M. 291/08	3rd June
N.G. 15 (Badila)	4th June
R.P. 6	10th June
Malabar	26th June
R.P. 8	22nd June

DISTRIBUTION OF VARIETIES, SEASON 1926.

Applications for varieties were not heavy this year. One crate of varieties was forwarded to the Saltwater District Local Producers' Association, Mossman. Seven bags of plants were distributed in the Johnstone area, nineteen bags in Mourilyan area, twelve bags in the Cairns district, and five bags of plants in the Tully area.

The canes chiefly applied for, in order of demand, were:—Tableland Badila, Badila Seedling, Oba Badila, Q. 813, E.K. 28, and E.K. 1.

ANNUAL FIELD DAY.

The Annual Field Day of the South Johnstone Sugar Experiment Station was held this year on Wednesday, 30th June. The day selected was fine, and a good attendance of farmers resulted. Addresses were delivered by the Director and the Entomologist (Mr. Jarvis). The Departmental Photographer, Mr. H. W. Mobsby, was in attendance, and secured a number of excellent photographs of the proceedings. During the afternoon a demonstration of field implements was made by Messrs. Robertson Brothers and C. J. Fleming, of Innisfail. Keen interest was taken in the work being done at the Station and the propagation of new seedling canes.

NEW EXPERIMENTS INITIATED, 1926-1927.

(1) Experiments using different parts of the stick of cane for plants, N.G. 15 or Badila—

Plot 1—Plants from top portion of stick;

Plot 2—Plants from middle portion of stick;

Plot 3—Plants from bottom portion of stick.

(2) Fertiliser experiments using heavy dressings of basic superphosphate and ordinary superphosphate in one and three dressings.

(3) Planting out of selected seedlings in a competitive trial.

YIELD OF CANE HARVESTED FROM THE SUGAR EXPERIMENT STATION AT SOUTH JOHNSTONE, SEASON 1926.

Cane sent to mill	475·375 tons
Used for plants	29·320 tons
Distributed to farmers	1·500 tons
Total	506·195 tons

Nature of Crop—

Plant cane	24·6 per cent.
First ratoons	37·2 per cent.
Second ratoons	38·2 per cent.

Tonnages—

	Tons cut.		Tons per acre.
Badila plant ..	93·38	=	42·25
Badila first ratoon ..	96·35	=	43·80
Badila second ratoon ..	179·51	=	36·12
Variety plant	30·69	=	30·69
Variety first ratoon ..	106·27	=	40·20

Acreage under cane	13·02
Tons of cane per acre	38·87

With the exception of the tonnages per acre and the seedling work, the experiments carried out at the South Johnstone Station this year have been somewhat disappointing owing to there being little or no difference between plots as the result of different treatment.

7.—WORK OF THE CENTRAL SUGAR EXPERIMENT STATION AT MACKAY.

The chemist in charge of the Sugar Experiment Station at Mackay is Mr. F. Keogh, who has performed his chemical duties and the carrying out of instructions relative to experimental work in the field in a satisfactory manner. The tables used in this part of the report have been prepared by Mr. Keogh, as well as notes on weather conditions, &c.

Mr. Walter Allan was appointed a cadet student at the Laboratory at Mackay in July of this year, and the chemist in charge speaks well of his work.

The field staff—Messrs. Andersen (foreman), Winton, Bailey, Benson, and Pearce—have for the greater part been employed on the Experiment Station for a number of years, and take much interest in the work.

Weather Notes covering period from March, 1925, to end of September, 1926.

The weather for planting in 1925 was favourable in early March, also at the end of that month, and the early part of April. The rainfall for February was 9·19 inches, ensuring ample moisture. This was followed by fairly fine weather till middle of March when good rain fell till 25th, the total for the month being 14·78 inches. The early planting on this station was done the first week in April, 1925, and an excellent strike resulted. The weather for April and May was mostly fine, the rainfall being much below the average, particularly May. Good rains followed in the middle of June, and July was mostly fine. August, an unusually dry month, exceeded the average; the precipitation was 3·93 inches on eight wet days. September also was a good month, the 1·40 inches registered being slightly below the average. October and November were both fine; the cane made good growth all the time and was fairly well favoured with heavy rains in December. This month 12·77 inches fell, but the greatest portion fell in a heavy thunderstorm on one night and the rain was not as beneficial as it would have been had it been spread over a greater number of wet days.

The growing conditions till the end of December were very favourable, as good strikes were the rule in the spring planting, and the rainfall was well distributed over this period. The cane up to this time was well advanced and continued with fairly rapid growth till March, 1926. The January, 1926, rainfall was much below the average, only 3·62 inches, and February 3·89. The following month almost reached the average, the total being 9·36 inches. Conditions till about this period could not have been improved upon greatly, the first two months were rather dry, but the previous six months were very favourable, also the month of March.

From this time onwards rain was scarce—April, 1·12 inches; May, ·53; June, 1·51; July, ·07; and August, ·28, a total of 3½ inches in five months compared with an average of 14¼ inches. This dry spell had a very adverse effect on the cane, particularly in some isolated cases where the cane at harvesting had a high percentage of dead stalks; and late ratoons made poor growth.

The total rainfall from 1st January to end of August, 1926, was 20·3 inches compared with approximately 40 inches for the same period in 1925, while the average for twenty-five years is 49·3 inches over those months.

On the whole the season was moderately good, and crops are cutting fair tonnages.

In addition to cane being affected with dry spell, some was badly damaged with frost, and in a number of cases farmers were unfortunate in having the cane completely checked in growth, the tops dying and cane deteriorating.

The breaking of the long dry spell occurred in September, when exceptionally good soaking rain fell on fifteen wet days, totalling 5·39 inches. This rain was of considerable benefit to the standing cane to be harvested, also to ratoon crops, and enabled farmers to do planting who had been waiting for rain.

Unfortunately this rain was not followed up by further falls, and October and November were very dry.

The following are the rainfall records taken at this station since 1900:—

Year.	Rainfall in inches.
1900	45·26
1901	63·45
1902	33·93
1903	64·93
1904	60·48
1905	69·50
1906	99·84
1907	51·78
1908	78·88
1909	63·98
1910	101·87
1911	65·35
1912	42·07
1913	85·16
1914	71·71
1915	36·27
1916	82·93
1917	67·92
1918	113·97
1919	38·03
1920	57·27
1921	95·89
1922	34·47
1923	25·23
1924	53·37
1925	54·80
1926 (10 months)	26·52

It will be seen from the above table that there is a considerable variation in the annual rainfall at Mackay, and that there has been a big decline in the average rainfall since 1921.

7. Central Sugar Experiment Station—*continued.*

Abstract of Meteorological Observations made at Sugar Experiment Station, Mackay, from 1st September, 1925, to 31st August, 1926—Covering Growth of Experiment Canes.

Month.	Rainfall in Inches.	Number of Wet Days.	Average Rainfall, 25 Years, 1901–1925.	Highest Shade Maximum.	Lowest Shade Maximum.	Mean Shade Maximum.	Highest Shade Minimum.	Lowest Shade Minimum.	Mean Shade Minimum.	Lowest Terrestrial Min.	Mean Terrestrial Min.	Mean Diurnal Range.	Mean Temperature, 9 a.m.	Mean Relative Humidity of the Air. Saturation equalling 100 at 9 a.m.	Mean Daily Evaporation in Inches.
Sep., 1925 ..	1·40	4	1·94	88·0	64·6	79·8	67·1	43·8	55·6	41·2	54·3	24·2	71·4	73·0	·22
Oct., 1925 ..	·21	2	1·02	90·9	81·0	86·2	69·8	50·0	59·9	48·9	58·8	26·3	78·3	67·0	·29
Nov., 1925 ..	·53	5	2·91	97·5	86·4	86·1	72·5	58·0	65·8	57·0	64·9	20·3	83·3	67·0	·19
Dec., 1925 ..	12·77	5	7·29	93·9	84·9	90·8	75·0	61·2	68·6	59·9	67·4	22·2	81·3	84·0	·25
Jan., 1926 ..	3·62	10	16·44	95·7	86·0	90·7	78·1	65·3	71·7	63·9	69·9	19·0	83·9	76·5	·21
Feb., 1926 ..	3·89	9	8·50	94·3	84·0	90·4	78·8	65·8	71·7	64·0	70·1	18·7	82·6	75·0	·24
Mar., 1926 ..	9·36	20	10·14	92·2	75·5	86·0	74·0	66·2	70·4	64·5	69·1	15·6	79·3	82·0	·20
Apr., 1926 ..	1·12	3	5·73	92·4	80·1	86·4	71·8	50·1	62·7	48·2	61·1	23·7	76·1	75·0	·19
May, 1926 ..	·53	4	3·28	94·8	71·7	83·5	71·7	44·9	55·8	42·8	54·0	27·7	70·3	73·0	·23
June, 1926 ..	1·51	5	2·65	84·5	70·2	78·1	68·6	40·2	55·9	36·1	54·6	22·2	67·8	74·0	·23
July, 1926 ..	·07	1	1·44	87·2	70·6	79·5	58·1	35·8	48·9	32·7	46·5	30·6	66·5	71·0	·24
Aug., 1926 ..	·28	2	1·16	89·3	75·2	82·6	66·0	37·4	52·5	33·2	51·1	30·1	71·5	69·0	·26
	35·29	70	62·50	..	..	..	..	..	..	..	..	..	..	*73·9	..

* Average.

EXPERIMENTS DEALT WITH IN THE FOLLOWING SECTION.

(1) Conclusion of liming experiment, second ratoon crop, Q. 813—

Plot 1—Pulverised limestone applied previous to plant crop at rate equivalent to 1 ton burnt lime per acre; first and second ratoon crops fertilised.

Plot 2—No lime; first and second ratoon crops fertilised.

Plot 3—Burnt lime applied previous to plant crop at rate of 1 ton per acre; first and second ratoon crops fertilised.

Plot 4—No lime; first and second ratoon crops fertilised.

(2) Comparative test with early and late maturing varieties, first ratoon crop.

Early maturing canes selected:—
D. 109.
H.Q. 285.
H.Q. 426.
Java E.K. 28.
Q. 813.

Late maturing varieties:—
N.G. 24 (Goru).
M. 1900 Seedling.
7R. 428 (Pompey).
N.G. 15 (Badila).
Cheribon.

(3) Green manure trials followed by cane—first ratoon crop—

Plot 1—Ordinary ploughing, cowpea sown broadcast previous to plant crop; first ratoon crop fertilised.

Plot 2—Ploughed and subsoiled previous to planting green crop; cowpea sown broadcast; first ratoon crop fertilised.

Plot 3—Ordinary ploughing; fertilised previous to planting green crop with sulphate of potash (100 lb. per acre) and superphosphate (200 lb. per acre); first ratoon crop fertilised.

Plot 4—Ordinary ploughing; cowpea sown broadcast; first ratoon crop fertilised.

(4) Experiments with fertilisers—two series—

First Series—

Plot 1—300 lb. sulphate of potash per acre.

Plot 2—500 lb. meatworks fertiliser per acre.

Plot 3—No fertiliser.

Plot 4—500 lb. superphosphate per acre.

Plot 5—500 lb. basic superphosphate per acre.

Plot 6—400 lb. nitrate of soda, 300 lb. sulphate of ammonia, 100 lb. sulphate of potash, and 400 lb. meatworks manure per acre.

Second Series—

Plot 1—400 lb. nitrate of soda per acre.

Plot 2—300 lb. sulphate of ammonia per acre.

Plot 3—No fertiliser.

Plot 4—400 lb. nitrate of soda and 200 lb. basic superphosphate per acre.

Plot 5—200 lb. nitrate of soda, 150 lb. sulphate of ammonia, 50 lb. sulphate of potash, and 200 lb. meatworks fertiliser per acre.

(5) Analyses of miscellaneous canes.

(6) Analyses of South Johnstone seedlings.

1. Conclusion of Experiment with Lime—Second Ratoon Crop, Q. 813.

In the preparation of the land for this experiment it was first ploughed, then Plots 1 and 3 were limed, the lime being harrowed in. Subsequently the land was ploughed four times and subsoiled. No fertilisers were applied to the plant crop. The treatment was as follows:—

Plot 1—Pulverised limestone at a rate equivalent to 1 ton of burnt lime per acre.

Plot 2—No lime.

Plot 3—Burnt lime at the rate of 1 ton per acre.

Plot 4—No lime.

7. Central Sugar Experiment Station—*continued.*

The results of the plant and first ratoon crops have already appeared. Fertilisers were applied to the ratoon crops.

After cutting the first ratoon crop the second ratoons came on well till the dry period set in, and the growth was then slow. The analytical and crop results are given hereunder:—

Analytical Results in Liming Experiments—2nd Ratoon Crop—October, 1926—Variety Q. 813.

Division.	Plot.	Variety.	Treatment.	Date of Analysis.	Age of Cane.	% Total Solids (Brix).	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.	% Fibre.	% Sucrose in Cane.	% C.C.S. in Cane.
A2	1	Q. 813 ..	Pulverised limestone at rate equivalent to one ton burnt lime per acre previous to plant crop, first and second ratoon crops fertilised with mixture	8–10–26	11 months	23·1	22·22	·21	96·2	13·0	18·22	17·63
A2	2	Q. 813 ..	No lime previous to plant crop, first and second ratoon crops fertilised with mixture	3–11–26	12 months	21·7	20·86	·22	96·1	13·0	17·10	16·54
A2	3	Q. 813 ..	Burnt lime rate of one ton per acre previous to plant crop, first and second ratoon crop fertilised with mixture	3–11–26	12 months	22·0	21·16	·21	96·2	13·0	17·35	16·78
A2	4	Q. 813 ..	No lime previous to plant crop, first and second ratoon crops fertilised with mixture	3–11–26	12 months	22·2	21·42	·21	96·5	13·0	17·56	17·02

Crop Results in Liming Experiments—2nd Ratoon Crop—October, 1926—Variety Q. 813.

Division.	Plot.	Variety.	Treatment.	Age of Cane.	Weight of Cane per Acre in English Tons.	Weight of Commercial Cane Sugar per Acre in English Tons.
A2 ..	1	Q. 813 ..	Pulverised limestone at rate equivalent to one ton burnt lime per acre previous to plant crop, first and second ratoon crops fertilised with mixture	11 months	21·5	3·79
A2 ..	2	Q. 813 ..	No lime previous to plant crop, first and second ratoon crops fertilised with mixture	12 months	23·2	3·83
A2 ..	3	Q. 813 ..	Burnt lime rate of one ton per acre previous to plant crop, first and second ratoon crops fertilised with mixture	12 months	20·5	3·44
A2 ..	4	Q. 813 ..	No lime previous to plant crop, first and second ratoon crops fertilised with mixture	12 months	16·1	2·74

The crop results were to some extent vitiated by the action of the mill in delaying harvesting. In consequence Plot 1 was cut a month before the other three, which thus had more time to make growth. The results are unsatisfactory, as will be seen from the average results in the following table of crop results to date. The pulverised limestone certainly appeared to increase the yield in the plant crop but the average of the three crops shows little advantage for lime. Perhaps a fair comparison would be Plot 1 against Plot 2, and Plot 3 against the average of 2 and 4. As the experiments went towards Plot 4 there was a slight rise in the ground which may account for the lower tonnage in Plot 4.

It is intended to repeat this experiment later with the view of trying to get more definite results.

7. Central Sugar Experiment Station—*continued.*

Crop Results to Date in Liming Experiments, Q. 813.

Division.	Plot.	Variety.	Treatment.	Plant Crop, 1924, 14 Months.		First Ratoon Crop, 1925, 12 Months.		Second Ratoon Crop, 1926, 11 Months.		Total Tonnage for Three Crops.		Average for Three Crops.	
				Weight of Cane per Acre in English Tons.	Weight of C.C.S. per Acre in English Tons.	Weight of Cane per Acre in English Tons.	Weight of C.C.S. per Acre in English Tons.	Weight of Cane per Acre in English Tons.	Weight of C.C.S. per Acre in English Tons.	Weight of Cane per Acre in English Tons.	Weight of C.C.S. per Acre in English Tons.	Weight of Cane per Acre in English Tons.	Weight of C.C.S. per Acre in English Tons.
A2	1	Q. 813..	Pulverised limestone at rate equivalent to one ton burnt lime per acre previous to plant crop, first and second ratoon crops fertilised with complete mixture	33·7	5·88	34·4	5·66	21·5	3·79	89·6	15·33	29·9	5·11
A2	2	Q. 813..	No lime previous to plant crop, first and second ratoon crops fertilised with complete mixture	30·4	5·55	34·3	5·81	23·2	3·83	87·9	15·19	29·3	5·06
A2	3	Q. 813..	Burnt lime rate one ton per acre previous to plant crop, first and second ratoon crops fertilised with complete mixture	29·3	5·48	31·4	5·28	20·5	3·44	81·2	14·20	27·1	4·73
A2	4	Q. 813..	No lime previous to plant crop, first and second ratoon crop fertilised with complete mixture	24·9	4·31	26·4	4·46	16·1	2·74	67·4	11·51	22·5	3 84

2. Comparative Test with Early and Late Maturing Varieties of Cane.

Early maturing canes selected—

D. 109.
H.Q. 285.
H.Q. 426 (Clark's seedling).
Java E.K. 28.
Q. 813.

Late maturing varieties—

Goru (N.G. 24).
1900 Seedling.
7 R. 428 (Pompey).
Badila N.G. 15.
Cheribon.

First ratoon crop.

The plant crop of the early maturing varieties was cut in September last year and the late canes were cut in November. Ratooning followed cutting, and fertilisers were applied as follows to each variety:—

Sulphate of ammonia	200 lb. per acre
Nitrate of soda	100 lb. per acre
Sulphate of potash	75 lb. per acre
Meatworks	300 lb. per acre

In December a top-dressing of 50 lb. nitrate of soda and 50 lb. sulphate of ammonia was given.

Of the early varieties E.K. 28 was the slowest at coming away, and was much slower in growth for the first few months. The others all ratooned well, but D. 109 was slower than the other three. Of the late maturing varieties Goru and 1900 Seedling were the slowest at ratooning, and both made rather poor growth throughout the season; the other three ratooned quickly and made good growth.

The following tables give the first preliminary examination and progressive analyses for the first ratoons:—

First Preliminary Examination in Comparative Experiments with Early and Late Maturing Varieties—1st Ratoon Crop.

Division.	Variety.	Date of Analysis.	Age of Cane.	% Total Solids (Brix).	% Sucrose in Juice.	Purity of Juice.	% C.C.S. in Cane.
	Early Maturing Varieties—June.						
C2 ..	D. 109	18–6–26	8½ months	18·3	15·01	82·0	11·04
	H.Q. 285	18–6–26	8½ months	19·1	17·08	89·4	13·31
	H.Q. 426	18–6–26	8½ months	21·6	19·81	91·7	15·67
	E.K. 28	18–6–26	8½ months	20·1	18·14	90·2	14·21
	Q. 813	18–6–26	8½ months	20·5	18·42	89·9	14·39
	Late Maturing Varieties—July.						
C2 ..	N.G. 24 (Goru)	23–7–26	8 months	21·1	18·88	89·5	14·70
	1900 S.	23–7–26	8 months	20·9	19·97	95·5	16·17
	7 R. 428 Pompey	23–7–26	8 months	19·5	16·53	84·8	12·44
	Badila	23–7–26	8 months	21·5	18·61	86·6	14·20
	Cheribon	23–7–26	8 months	19·5	15·29	78·4	10·88

7. Central Sugar Experiment Station—*continued.*

Second Progressive Examination in Comparative Experiments with Early and Late Maturing Varieties—1st Ratoon Crop.

Division.	Variety.	Date of Analysis.	Age of Cane.	% Total Solids (Brix).	% Sucrose in Juice.	Purity of of Juice.	% C.C.S. in Cane.
	Early Maturing Varieties—July.						
C2 ..	D. 109	23–7–26	9½ months	19·4	15·75	81·2	11·50
	H.Q. 285	23–7–26	9½ months	20·4	18·49	90·6	14·52
	H.Q. 426	23–7–26	9½ months	23·5	21·89	93·1	17·47
	E.K. 28	23–7–26	9½ months	21·7	19.40	89·4	15·11
	Q. 813	23–7–26	9½ months	22·0	20·32	92·4	16·12
	Late Maturing Varieties—August.						
C2 ..	N.G. 24 (Goru)	29–8–26	9 months	23·8	22·47	94·4	17·97
	1900 S.	29–8–26	9 months	24·3	23·18	95·3	18·76
	7 R. 428 (Pompey)	29–8–26	9 months	22·3	20·27	90·8	15·95
	Badila	29–8–26	9 months	22·9	21·55	94·1	17·30
	Cheribon	29–8–26	9 months	21·5	17·45	81·1	12·43

Third Progressive Examination in Comparative Experiments with Early and Late Maturing Varieties. First Ratoon Crop.

Division.	Variety.	Date of Analysis.	Age of Cane.	% Total Solids (Brix).	% Sucrose in Juice.	Purity of Juice.	% C.C.S. in Cane.
	Late Maturing Varieties—September.						
C2 ..	N.G. 24 Goru	29–9–26	10 months	23·3	22·27	95·9	17·93
C2 ..	1900 S.	29–9–26	10 months	23·1	22·23	96·2	18·07
C2 ..	7R 428 (Pompey)	29–9 26	10 months	20·0	18·55	92·7	14·77
C2 ..	Badila	29–9–26	10 months	22·7	21·76	95·9	17·66
C2 ..	Cheribon	29–9–26	10 months	21·2	19·40	91·5	14·95

Final Examination in Comparative Experiments with Early and Late Maturing Varieties. First Ratoon Crop.

Division.	Variety.	Date of Analysis.	Age of Cane.	Total Solids (Brix).	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.	Fibre.	% Sucrose in Cane.	%C.C.S. in Juice.
	Early Maturing Varieties—August.									
C2	D. 109	29–8–26	10½ months	21·5	18·78	·32	87·3	13·0	15·39	14·07
C2	H.Q. 285	29–8–26	10½ months	22·0	19·97	·25	90·8	13·0	16·37	15·42
C2	H.Q. 426	29–8 26	10½ months	24·1	23·03	·17	95·5	11·0	19·34	18·65
C2	E.K. 28	29–8–26	10½ months	24·0	22·57	·20	94·0	12·0	18·73	17·79
C2	Q. 813	29–8–26	10½ months	23·4	21·83	·22	93·3	12·5	18·0	17·12
	Late Maturing Varieties—October.									
C2	N.G. 24 (Goru)	21 10 -26	11 months	20·2	19·16	·23	94·8	12·5	15·80	15·17
C2	1900 S.	21 -10–26	11 months	20·9	20·19	·23	96·6	11·0	16·95	16·45
C2	7R 428 (Pompey) ..	21 10–26	11 months	18·9	17·75	·25	93·9	11·0	14·91	14·23
C2	Badila	21 -10–26	11 months	22·3	21·21	·21	95·1	11·0	17·81	17·13
C2	Cheribon	21–10–26	11 months	19·3	17·87	·28	92·6	13·0	14·65	13·87

From the final analysis it will be seen that H.Q. 426 in the early canes and N.G. 15 (Badila) in the late canes gave the highest commercial cane sugar.

The crop results of the first ratoons are now presented:—

Crop Results on Comparative Experiments with Early and Late Maturing Varieties. First Ratoon Crop, 1926.

Division.	Variety.	Age of Cane.	Weight of Cane per Acre in English Tons.	Weight of Sugar per Acre in English Tons.
	Early Maturing Varieties—August.			
C2	D. 109	10½ months	26·7	3·75
C2	H.Q. 285	10½ months	23·9	3·68
C2	H.Q. 426	10½ months	26·8	5·0
C2	E.K. 28	10½ months	28·5	5·07
C2	Q. 813	10½ months	31·5	5·39
	Late Maturing Varieties—October.			
C2	N.G. 24 (Goru)	11 months	23·1	3·50
C2	1900 S.	11 months	22·8	3·75
C2	7R 428 (Pompey)	11 months	36·1	5·13
C2	Badila	11 months	30·1	5·15
C2	Cheribon	11 months	31·6	4·38

7. Central Sugar Experiment Station—*continued.*

The heaviest yield was from Q. 813 in the early varieties, followed by H.Q. 426, E.K. 28, and D. 109, which latter, however, appears more of a late cane than an early one.

In the late canes Badila, while not giving the heaviest tonnage, would be the most payable crop on account of its much higher commercial cane sugar and the smaller cost for cutting. 7 R. 428 or Pompey gave the highest yield, but its commercial cane sugar content is only 14·23 per cent., as against 17·13 per cent. in Badila. The 1900 Seedling did not do so well as expected nor did the Goru (N.G. 24). The commercial cane sugar in this variety dropped rather quickly after September.

In the following tables the analytical and crop results of this experiment to date are given:—

Analytical Results to Date in Comparative Experiments with Early and Late Maturing Varieties.

Division.	Variety.	Plant Crop, 1925. 13 Months. % Commercial Cane Sugar.	First Ratoon Crop, 1926. 10½ Months. % Commercial Cane Sugar.	Average for Two Years. % Commercial Cane Sugar.
	Early Maturing Varieties.			
C.2	D. 109	12·92	14·07	13·50
C.2	H.Q. 285	15·48	15·42	15·45
C.2	H.Q. 426	16·33	18·65	17·49
C.2	E.K. 28	17·02	17·79	17·40
C.2	Q. 813	16·58	17·12	16·85
	Late Maturing Varieties—Plant Crop—14½ months. First Ratoon—11 months.			
C.2	N.G. 24 (Goru)	14·28	15·17	14·22
C.2	1900 Seedling	16·60	16·45	16·52
C.2	7R 428 (Pompey)	14·84	14·23	14·53
C.2	Badila	16·99	17·13	17·06
C.2	Cheribon	14·33	13·87	14·10

Crop Results to Date in Comparative Experiments with Early and Late Maturing Varieties.

Division.	Variety.	Plant Crop, 1925. 13 Months. Weight of Cane per Acre in English Tons.	Plant Crop, 1925. 13 Months. Weight of Commercial Cane Sugar per Acre in English Tons.	First Ratoon Crop, 1926—10½ Months. Weight of Cane per Acre in English Tons.	First Ratoon Crop, 1926—10½ Months. Weight of Commercial Cane Sugar per Acre in English Tons.	Average for Two Crops. Weight of Cane per Acre in English Tons.	Average for Two Crops. Weight of Commercial Cane Sugar per Acre in English Tons.
	Early Maturing Varieties.						
C.2	D. 109	45·1	5·82	26·7	3·75	35·9	4·78
C.2	H.Q. 285	32·6	5·04	23·9	3·68	28·2	4·36
C.2	H.Q. 426	46·5	7·59	26·8	5·0	36·6	6·29
C.2	E.K. 28	47·7	8·12	28·5	5·07	38·1	6·59
C.2	Q. 813	48·4	8·02	31·5	5·39	39·9	6·70
	Late Maturing Varieties. Plant Crop—14½ months. First Ratoon—11 months.						
C.2	N.G. 24 (Goru)	42·2	6·02	23·1	3·50	32·6	4·76
C.2	1900 Seedling	41·9	6·95	22·8	3·75	32·3	5·35
C.2	7R 428 (Pompey)	47·3	7·01	36·1	5·13	41·7	6·07
C.2	Badila	41·8	7·10	30·1	5·15	36·0	6·12
C.2	Cheribon	49·3	7·06	31·6	4·38	40·4	5·72

3. Green Manure Trials followed by Cane.

Different treatment of land—

Plot 1—Ordinary ploughing; cowpea sown broadcast.

Plot 2—Ploughed and subsoiled; cowpea sown broadcast.

Plot 3—Ordinary ploughing; fertilised; cowpea sown broadcast.

Plot 4—Ordinary ploughing; cowpea sown broadcast.

In the above experiment the piece of ground selected for this trial received two ploughings. Plot 2 was subsoiled, and the manure, consisting of 200 lb. meatworks and 100 lb. sulphate of potash per acre, was applied to Plot 3. Green manure in the shape of cowpea was then sown, and the resulting crop ploughed under. The land received two further ploughings, and was planted early in April, but owing to damage by wireworms it was ploughed out and replanted early in August, the strike being excellent. The cane in all the plots made good growth throughout the season. No fertilisers were applied to the plant crop, except the meatworks and potash to Plot 3.

The plant crop was harvested last year, and particulars thereof appeared in last year's report. The first ratoon crop was fertilised as follows:—

Sulphate of ammonia	200 lb. per acre
Nitrate of soda	100 lb. per acre
Sulphate of potash	75 lb. per acre
Meatworks	300 lb. per acre

This was followed later by a top-dressing of 50 lb. sulphate of ammonia and 50 lb. nitrate of soda per acre.

7. Central Sugar Experiment Station—*continued.*

The following tables disclose the analytical and crop results of the first ratoon crop:—

Analytical Results in Green Manure Experiments with Different Treatment of Land. First Ratoon Crop—1926—Q. 813.

Division.	Plot.	Variety.	Treatment.	Date of Analysis.	Age of Cane.	% Total Solids (Brix).	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.	Fibre.	% Sucrose in Cane.	% C.C.S. in Cane.
A1	1	Q. 813	Ordinary ploughing, cowpea sown broadcast for Plant Crop. Ratooned to 15 in. deep with plough and subsoiler	28–9–26	11 months	22·6	21·64	·22	95·8	12·5	17·85	17·23
A1	2	Q. 813	Ploughed and subsoiled, cowpea sown broadcast for Plant Crop. Ratooned to 15 in. deep with plough and subsoiler	28–9–26	11 months	23·3	22·53	·21	96·7	12·5	18·58	18·03
A1	3	Q. 813	Ordinary ploughing, fertilised with superphosphate and potash, cowpea sown broadcast. Ratooned to 15 in. deep with plough and subsoiler	28–9–26	11 months	23·2	22·12	·23	94·9	12·5	18·25	17·57
A1	4	Q. 813	Ordinary ploughing, cowpea sown broadcast for Plant Crop. Ratooned to 15 in. deep with plough and subsoiler	28–9–26	11 months	22·8	22·05	·22	96·7	12·5	18·19	17·65

Crop Results in Green Manuring Experiments with Different Treatment of Land—Frst Ratoon Crop—1926.—Q. 813.

Division.	Plot.	Variety.	Treatment.	Age of Cane.	Weight of Cane per Acre in English Tons.	Weight of Commercial Cane Sugar per Acre in English Tons.
A1 ..	1	Q 813 ..	Ordinary ploughing, cowpea sown broadcast for Plant Crop. Ratooned to 15 in. deep with plough and subsoiler	11 months	23·5	4·05
A1 ..	2	Q. 813 ..	Ploughed and subsoiled, cowpea sown broadcast for Plant Crop. Ratooned to 15 in. deep with plough and subsoiler	11 months	27·1	4·88
A1 ..	3	Q. 813 ..	Ordinary ploughing, fertilised with superphosphate and potash, cowpea sown broadcast. Ratooned to 15 in. deep with plough and subsoiler	11 months	27·3	4·79
A1 ..	4	Q. 813 ..	Ordinary ploughing, cowpea sown broadcast for Plant Crop. Ratooned to 15 in. deep with plough and subsoiler	11 months	25·7	4·54

From the average crop results which appear below there is not much difference to be seen between the yields of the various plots.

Analytical Results to Date in Green Manuring Experiments with Different Treatment of Land—Q. 813.

Division.	Plot.	Variety.	Treatment.	Plant Crop, 1925—Fourteen Months.	First Ratoon, 1926—Eleven Months.	Average for Two Crops.
				% Commercial Cane Sugar.	% Commercial Cane Sugar.	% Commercial Cane Sugar.
A1 ..	1	Q. 813 ..	Ordinary ploughing, cowpea sown broadcast for Plant Crop. Ratooned to 15 in. deep with plough and subsoiler	16·76	17·85	17·30
A1 ..	2	Q. 813 ..	Ploughed and subsoiled, cowpea sown broadcast for Plant Crop. Ratooned to 15 in. deep with plough and subsoiler	16·78	18.58	17·68
A1 ..	3	Q 813 ..	Ordinary ploughing, fertilised with superphosphate and potash, cowpea sown broadcast for Plant Crop. Ratooned to 15 in. deep with plough and subsoiler	17·58	18·25	17·91
A1 ..	4	Q. 813 ..	Ordinary ploughing, cowpea sown broadcast for Plant Crop. Ratooned to 15 in. deep with plough and subsoiler	17·59	18·19	17·89

7. Central Sugar Experiment Station—*continued.*

Crop Results to Date in Green Manuring Experiments with Different Treatment of Land—Q. 813.

Division.	Plot.	Variety.	Treatment.	Plant Crop, 1925. 14 Months.		First Ratoon Crop, 1926. 11 Months.		Average for Two Crops.	
				Weight of Cane per Acre in English Tons.	Weight of C.C.S. per Acre in English Tons.	Weight of Cane per Acre in English Tons.	Weight of C.C.S. per Acre in English Tons.	Weight of Cane per Acre in English Tons.	Weight of C.C.S. per Acre in English Tons.
A1 ..	1	Q. 813	Ordinary ploughing, cowpea sown broadcast for plant crop. Ratooned to 15 in. deep with plough and subsoiler	42·8	7·17	23·5	4·05	33·1	5·61
A1 ..	2	Q. 813	Ploughed and subsoiled, cowpea sown broadcast for plant crop. Ratooned to 15 in. deep with plough and subsoiler	44·4	7·45	27·1	4·88	35·7	6·16
A1 ..	3	Q. 813	Ordinary ploughing, fertilised with superphosphate and potash, cowpea sown broadcast for plant crop. Ratooned to 15 in. deep with plough and subsoiler.	45·3	7·96	27·3	4·79	36·3	6·37
A1 ..	4	Q. 813	Ordinary ploughing, cowpea sown broadcast for plant crop. Ratooned to 15 in. deep with plough and subsoiler.	44·9	7·89	25·7	4·54	35·3	6·21

4. Experiments with Fertilisers—Two Series.

First Series—

Plot 1—300 lb. sulphate of potash per acre.

Plot 2—500 lb. meatworks fertiliser per acre.

Plot 3—No manure.

Plot 4—500 lb. superphosphate per acre.

Plot 5—500 lb. basic superphosphate per acre.

Plot 6—400 lb. nitrate of soda, 300 lb. sulphate of ammonia, 100 lb. sulphate of potash, and 400 lb. meatworks per acre.

Second Series—

Plot 1—400 lb. nitrate of soda.

Plot 2—300 lb. sulphate of ammonia.

Plot 3—No manure.

Plot 4—400 lb. nitrate of soda and 200 lb. basic superphosphate per acre.

Plot 5—200 lb. nitrate of soda, 150 lb. sulphate of ammonia, 50 lb. sulphate of potash, and 200 lb. meatworks per acre.

The above experiment was initiated for the purpose of testing certain fertilisers, also heavy dressings of nitrogen. The land was well prepared for the cane, which was planted in April of 1925. The germination was good. In making notes on the crop only a slight difference could be seen, but the cane in the first series had a somewhat better appearance than it did in the second series.

The analytical and crop results are set out in the following tables:—

Analytical Results in Fertilising Trials. Plant Crop—7R 428 (Pompey)—October, 1926.

Division.	Plot.	Treatment—Fertiliser per Acre.	Date of Analysis.	Age of Cane.	% Total Solids (Brix).	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.	Fibre.	% Sucrose in Cane.	% C.C.S. in Cane
				First Series.							
Z1	1	300 lb. sulphate of potash ..	14–10–26	18½ months	21·3	19·83	·28	93·1	10·5	16·75	15·92
Z1	2	500 lb. meatworks fertiliser ..	14–10–26	18½ months	19·9	18·81	·26	94·5	10·5	15·89	15·23
Z1	3	No fertiliser	14–10–26	18½ months	19·8	18·83	·26	95·1	10·5	15·91	15·30
Z1	4	500 lb. superphosphate ..	14–10–26	18½ months	20·3	19·17	·26	94·4	10·5	16·19	15·52
Z1	5	500 lb. basic superphosphate	14–10–26	18½ months	20·1	18·84	·28	93·7	10·5	15·90	15·19
Z1	6	400 lb. nitrate soda, 300 lb. sulphate ammonia, 100 lb. sulphate potash, 400 lb. meatworks fertiliser	14–10–26	18½ months	20·0	18·36	·30	91·8	10·5	15·51	14·62
				Second Series.							
Z2	1	400 lb. nitrate of soda ..	14–10–26	18½ months	20·3	18·16	·31	89·4	10·5	15·34	14·24
Z2	2	300 lb. sulphate of ammonia..	14–10–26	18½ months	20·2	17·86	·33	88·9	10·5	15·09	13·9
Z2	3	No fertiliser	14–10–26	18½ months	19·4	18·27	·27	94·2	10·5	15·43	14·76
Z2	4	400 lb. nitrate soda, 200 lb. basic superphosphate	14–10–26	18½ months	20·2	19·0	·28	94·0	10·5	16·05	15·34
Z2	5	200 lb. nitrate soda. 150 lb. sulphate ammonia, 50 lb. sulphate potash, 200 lb. meatworks fertiliser	14–10–26	18½ months	20·0	18·81	·26	94·0	10·5	15·89	15·19

7. Central Sugar Experiment Station—*continued.*

Crop Results in Fertilising Trials. Plant Crop—7R 428 (Pompey)—October, 1926.

Division.	Plot.	Treatment—Fertiliser per Acre.	Age of Cane.	Weight of Cane per Acre in English Tons.	Weight of Commercial Cane Sugar per Acre in English Tons.
		First Series.			
Z1	1	300 lb. sulphate of potash	18½ months	43·1	6.86
Z1	2	500 lb. meatworks fertiliser	18½ months	45·5	6·93
Z1	3	No fertiliser	18½ months	44·2	6·76
Z1	4	500 lb. superphosphate	18½ months	45·9	7·12
Z1	5	500 lb. basic superphosphate	18½ months	37·6	5·71
Z1	6	400 lb. nitrate soda, 300 lb. sulphate ammonia, 100 lb. sulphate potash, 400 lb. meatworks	18½ months	45·1	6·59
		Second Series.			
Z2	1	400 lb. nitrate soda	18½ months	42·8	6·09
Z2	2	300 lb. sulphate ammonia	18½ months	43·4	6·03
Z2	3	No fertiliser	18½ months	40·8	6·02
Z2	4	400 lb. nitrate soda, 200 lb. basic superphosphate ..	18½ months	38·3	5·87
Z2	5	200 lb. nitrate soda, 150 lb. sulphate ammonia, 50 lb. sulphate potash, 200 lb. meatworks	18½ months	38·3	5·82

From the analytical table it will be seen that the heavy dressings of nitrogen in Plot 6, first series, had the effect of lowering the commercial cane sugar, which is also evident in Plots 1 and 2 of the second series when nitrogen was used alone. The crop results in the plant crop do not disclose any very marked differences, the superphosphate, meatworks, and heavy dressing of nitrogen in a mixed fertiliser giving the best results in Series No. 1, but not enough to be a payable proposition. The differences, however, for the use of fertilisers in a plant crop are never very great where the land has been well prepared and green manures have been used. More striking differences are expected from the succeeding ratoon crops.

5. Analytical Results of Miscellaneous Canes.

Many of the canes appearing in the tables given below are new to Mackay, and some of these are promising. The tables hereunder give the first preliminary, progressive, and final analyses:—

First Preliminary Examination of Miscellaneous Canes—Plant Crop—June, 1926.

Variety.	Date of Analysis.	Age of Cane.	Crop.	Total Solids (Brix).	% Sucrose in Juice.	Purity of Juice.	% C.C.S. in Cane.
Q. 813 Sport	17 June	9½ months	Plant ..	20.0	18·24	91·2	14·38
P.O.J. 100	17 June	9½ months	Plant ..	16.8	12·01	71·5	7·90
P.O.J. 213	17 June	9½ months	Plant ..	16·7	13·98	83·7	10·43
P.O.J. 2714	17 June	9½ months	Plant ..	16·3	12·51	76·9	8·75
H. 456	17 June	9½ months	Plant ..	16·9	13·90	82·2	10·24
H. 468	17 June	9½ months	Plant ..	14·3	10·67	74·6	7·29
H. 1801	17 June	9½ months	Plant ..	16·1	12·59	78·2	8·94
H. 5803	17 June	9½ months	Plant ..	15·6	11·48	73·6	7·75
Striped Tip	17 June	9½ months	Plant ..	17·5	13·58	77·6	9·58
D.I. 52	17 June	9½ months	Plant ..	18·2	14·96	82·2	11·02
90 F.	17 June	9½ months	Plant ..	18·7	16·58	88·7	12·85
Luzon 2	17 June	9½ months	Plant ..	17·6	15·37	87·3	11·79
Luzon 4	17 June	9½ months	Plant ..	17·9	16·0	89·4	12·46
R.P. 6	17 June	9½ months	Plant ..	14·8	10·98	74·2	7·47
R.P. 8	17 June	9½ months	Plant ..	15·9	9·56	60·1	5·20
M. 291/08	17 June	9½ months	Plant ..	17·1	12·86	75·2	8·85
M. 64/14	17 June	9½ months	Plant ..	18·3	15·66	85·6	11·86
M. 131/126	17 June	9½ months	Plant ..	16·8	12·99	77·3	9·14
M. 33/95	17 June	9½ months	Plant ..	16·7	13·83	82·8	10·24
M. 55/453	17 June	9½ months	Plant ..	16·1	11·68	77·5	7·79
N.G. 24A	17 June	9½ months	Plant ..	18·1	14·65	80·9	10·67
H. 146	17 June	9½ months	Plant ..	18·8	16·66	88·6	12·90
H. 227	17 June	9½ months	Plant ..	16·6	13·21	79·6	9·50
E.K. 28	17 June	9½ months	Plant ..	16·4	12·83	78·2	9·11
Q. 1092	17 June	9½ ,onths	Plant ..	15·5	10·36	66·8	6·38
B. 156	17 June	9½ months	Plant ..	18·2	15·76	86·6	12·03
H.Q. 409	17 June	9½ months	Plant ..	18·8	16·11	85·7	12·21
M. 1900	17 June	9½ months	Plant ..	19·4	17·44	89·9	13·63
H.Q. 426	17 June	9½ months	Plant ..	21·1	19·33	91·7	15·28

7. Central Sugar Experiment Station—*continued.*

First Progressive Examination of Miscellaneous Canes. Plant Crop—July, 1926.

Variety.	Date of Analysis.	Age of Cane.	Crop.	Total Solids (Brix).	% Sucrose in Juice.	% C.C.S. in Cane.	Purity.
Q. 813 Sport	23–7–26	10½ months	Plant	22·8	20·88	16·4	91·6
P.O.J. 100	23–7–26	10½ months	Plant	21·7	18·46	13·93	85·1
P.O.J. 213	23–7–26	10½ months	Plant	21·5	18·66	14·26	86·8
P.O.J. 2714	23–7–26	10½ months	Plant	21·7	18·64	14·15	85·9
H. 456	23–7–26	10½ months	Plant	20·9	18.92	14·85	90·5
H. 468	23–7–26	10½ months	Plant	18·6	15·70	11·78	84·4
H. 1801	23–7–26	10½ months	Plant	18·8	15·33	11·23	81·5
H. 5803	23–7–26	10½ months	Plant	20·0	15·87	11·39	79·3
Striped Tip	23–7–26	10½ months	Plant	21·5	19·08	14·79	88·7
D.I. 52	23–7–26	10½ months	Plant	21·3	19·21	15·04	90·2
90 F.	23–7–26	10½ months	Plant	22·6	21·31	17·13	94·3
Luzon 2	23–7–26	10½ months	Plant	21·4	20·05	16·06	93·7
Luzon 4	23–7–26	10½ months	Plant	20·9	19·73	15·87	94·4
R·P· 6	23–7–26	10½ months	Plant	18·7	16·12	12·27	85·5
R.P. 8	23–7–26	10½ months	Plant	18·8	14·74	10·49	78·4
M. 291/08	23–7–26	10½ months	Plant	19·9	16·87	12·70	84·8
M. 131/ 126	23–7–26	10½ months	Plant	19·4	16·33	12·23	84·2
M. 33/95	23–7–26	10½ months	Plant	20·2	18·50	14·62	91·5
M. 64/14	23–7–26	10½ months	Plant	21·3	20·07	16·13	94·2
M. 55/453	23–7–26	10½ months	Plant	17·6	13·63	9·60	74·4
N.G. 24A	23–7–26	10½ months	Plant	20·3	18·55	14·64	91·4
H. 146	23–7–26	10½ months	Plant	20·2	18·84	15·05	93·2
H. 227	23–7–26	10½ months	Plant	19·0	16·83	13·03	88·6
E.K. 28	23–7–26	10½ months	Plant	20·7	19·33	15·45	93·3
Q. 1092	23–7–26	10½ months	Plant	19·8	17·19	13·14	86·8
B. 156	23–7–26	10½ months	Plant	21·2	20·13	16·25	94·9
H.Q. 409	23–7–26	10½ months	Plant	21·5	20·06	16·03	93·3

Final Examination of Miscellaneous Canes. Plant Crop—August, 1926.

Variety.	Date of Analysis.	Age of Cane.	Crop.	Total Solids (Brix).	% Sucrose in Juice.	% C.C.S. in Cane.	Purity.
Q. 813 Sport	16–8–26	11½ months	Plant	22·4	21·17	17·04	94·5
P.O.J. 100	16–8–26	11½ months	Plant	21·7	19·79	15·60	91·2
P.O.J. 213	16–8–26	11½ months	Plant	21·8	20·60	16·58	94·5
P.O.J. 2714	16–8–26	11½ months	Plant	21·7	19·58	15·34	90·2
H. 456	16–8–26	11½ months	Plant	21·3	19·73	15·70	92·6
H. 468	16–8–26	11½ months	Plant	18·4	16·67	13·09	90·6*
H. 1801	16–8–26	11½ months	Plant	18·3	15·90	12·16	86·9*
H. 5803	16–8–26	11½ months	Plant	19·4	16·26	12·14	83·8
Striped Tip	16–8–26	11½ months	Plant	22·7	20·73	16·36	91·3
D.I. 52	16–8–26	11½ months	Plant	21·5	19·02	14·72	88·5*
90 F.	16–8–26	11½ months	Plant	22·2	20·93	16·83	94·3
Luzon 2	16–8–26	11½ months	Plant	21·4	20·16	16·20	94·2
Luzon 4	16–8–26	11½ months	Plant	21·7	20·42	16·40	94·1
R.P. 6	16–8–26	11½ months	Plant	18·5	16·21	12·47	87·6
R.P. 8	16–8–26	11½ months	Plant	19·3	16·20	12·11	83·9*
M. 291/08	16–8–26	11½ months	Plant	19·8	17·38	13·38	87·8
M. 131/126	16–8–26	11½ months	Plant	21·0	18·94	14·85	90·2*
M. 33/95	16–8–26	11½ months	Plant	17·8	14·30	10·36	81·5*
M. 64/14	16–8–26	11½ months	Plant	20·1	18·11	14·17	90·1
M. 55/453	16–8–26	11½ months	Plant	18·9	15·12	10·92	84·3
N.G. 24A	16–8–26	11½ months	Plant	21·8	19·92	15·72	91·4
H. 146	16–8–26	11½ months	Plant	21·7	19·61	15·19	90·4
H. 227	16–8–26	11½ months	Plant	20·6	18·11	13·79	83·0
E.K. 28	16–8–26	11½ months	Plant	21·9	20·07	15·87	91·6
Q. 1092	16–8–26	11½ months	Plant	20·5	17·92	13·59	87·4
B. 156	16–8–26	11½ months	Plant	22·6	20·88	16·39	92·4
H.Q. 409	16–8–26	11½ months	Plant	21·9	20·51	16·20	93·6*

* Discarded.

The best analyses of the new canes are of 90 F. and P.O.J. 2714. The former promises to be an early maturing variety while the latter is an erect, quick-growing cane with long internodes, a self trasher, and late maturer.

The two Philippine canes, Luzon 2 and Luzon 4, are good growers and of fairly good sugar content. Striped Tip is considered a good cane in Hawaii and is a thin cane with a large number of sticks to the stool. The ratoons at present are very prolific in the number of sticks; the c.c.s. results for July and August are good. It is a cane that possibly would replace the Uba variety, being a little thicker and not so hard or so high in fibre.

Of the five Mauritius canes none of them are in any way promising. Q. 813 Sport, a striped cane sport from original Q. 813, which will be designated in future as Q. 813 Sport A, is promising; it has a broader and softer leaf than Q. 813, and a little thicker in the stick. It is possible it may be better than Q. 813. It will be tried out next year with the other sport, Q. 813 Sport B (green colour) against the original Q. 813.

7. Central Sugar Experiment Station—*continued.*

6. Analytical Results of Seedling Canes from South Johnstone.

The first batch of the new seedling canes raised at the South Johnstone Experiment Station was introduced last year. The cuttings germinated well and made good growth. They are clean, healthy-looking canes with good foliage. Of the canes having Badila as one parent none appear so thick as that cane, except S.J.Q. No. 10, which is about 3 inches in diameter. The commercial cane sugar results are excellent, as will be seen from the final table. S.J.Q. 28 is a seedling with Goru (N.G. 24) as one parent, and it is also high in sugar with an erect growth.

Preliminary Examination of South Johnstone Seedlings. July, 1926.

Variety.	Date of Analysis.	Age of Cane.	Crop.	% Total Solids (Brix).	% Sucrose in Juice.	Purity of Juice.	% C.C.S. in Cane.	Variety from which Seed was taken.
S.J.Q. 2	23–7–26	10½ months	Plant..	21·9	20·07	91·6	15·87	Badila
S.J.Q. 3	23–7–26	10½ months	Plant..	20·7	18·81	90·9	14·88	Badila
S.J.Q. 4	23–7–26	10½ months	Plant..	20·4	17·93	87·9	13·82	Badila
S.J.Q. 5	23–7–26	10½ months	Plant..	21·7	19·37	89·2	15·07	Badila
S.J.Q. 10	23–7–26	10½ months	Plant..	19·5	17·02	87·3	13·06	Badila
S.J.Q. 15	23–7–26	10½ months	Plant..	21·1	18·88	89·5	14·71	Badila
S.J.Q. 16	23–7–26	10½ months	Plant..	19·9	18·66	93·8	14·95	Badila
S.J.Q. 28	23–7–26	10½ months	Plant..	19·3	16·83	87·2	12·90	N.G. 24 Goru
S.J.Q. 468	23–7–26	10½ months	Plant..	20·4	16·98	83·2	12·62	N.G. 24 Goru

Final Examination of South Johnstone Seedlings. September, 1926.

Variety.	Date of Analysis.	Age of Cane.	Crop.	% Total Solids (Brix).	% Sucrose in Juice.	Purity of Juice.	% Sucrose in Cane.	% C.C.S. in Cane.	Variety from which Seed was taken.
S.J.Q. 2 ..	13–9–26	12 months	Plant..	24·6	23·24	94·4	19·52	18·69	Badila
S.J.Q. 3 ..	13–9–26	12 months	Plant..	23·0	21·70	94·3	18·22	17·45	Badila
S.J.Q. 4 ..	13–9–26	12 months	Plant..	22·1	20·33	92·0	17·07	16·11	Badila
S.J.Q. 5 ..	13–9–26	12 months	Plant..	22·9	20·71	90·4	17·39	16·25	Badila
S.J.Q. 10 ..	13–9–26	12 months	Plant..	21·4	19·92	93·1	16·72	15·89	Badila
S.J.Q. 15 ..	13–9–26	12 months	Plant..	23·8	22·01	92·4	18·48	17·50	Badila
S.J.Q. 16 ..	13–9–26	12 months	Plant..	23·1	21·96	95·1	18·44	17·73	Badila
S.J.Q. 28 ..	13–9–26	12 months	Plant..	23·1	22·25	96·3	18·69	18·10	N.G. 24 (Goru)
S.J.Q. 468 ..	13–9–26	12 months	Plant..	21·6	19·77	91·5	16·60	15·62	N.G. 24 (Goru)

Annual Field Day.

The usual Annual Field Day of the Experiment Station at Mackay was held on Friday, 4th June, a record number of cane farmers attending. The farmers showed a keen interest in new varieties, and much information was sought about the popular varieties at present grown, as to their resistance to disease, &c., and the classes of soil they are suited for. Growers were shown over the Station and their various questions answered. After luncheon addresses were delivered by Mr. J. F. Reid (Editor of the "Agricultural Journal"), on Agricultural Improvement and Education, Mr. R. W. Mungomery, on Cane Pests, and by the Director.

The afternoon was devoted to displays of tractors and agricultural machinery. Displays were made by Messrs. Croker and Sons, Hansen and Dubois, and Mitchell and Spinks, to all of whom the thanks of the Bureau are due.

Dates of Arrowing of Varieties.

Q. 855: 1st June (freely).

Q. 1098: 1st June (freely).

M. 28/10: 5th June (freely).

7 R. 428 (Pompey): 4th July (very sparse).

E.K. 28 (1st ratoons): 10th July (very sparse).

P.O.J. 2714: 29th July (sparse).

H. 5803: 1st August (sparse).

90 F.: 1st August (sparse).

Q. 813 (1st ratoons): 3rd August (very sparse).

New Experiments to be Undertaken.

1. Competitive trials with Q. 813 and sports of same.

2. Competitive trials with South Johnstone Queensland seedlings.

Yield of Cane Harvested from the Sugar Experiment Station at Mackay, Season 1926.

	Tons.
Cane sent to mill up to 15th November	334·4
Estimated tonnage to harvest	26·7
Distributed to farmers and used for analyses ..	4·0
Used for plants	1·0
	366·1

Nature of Crop—

Plant cane, 5·8 acres	39·5 per cent.
First ratoons, 5·7 acres	38·8 per cent.
Second ratoons, 3·2 acres	21·7 per cent.

Tonnages—

	Tons Cut. T. C. Q.	Tons per Acre.
Plant cane	178 10 0	30·8
First ratoons ..	118 2 0	20·7
Second ratoons ..	69 10 0	21·7
Acreage under cane		14·7 acres
Tons cane per acre		24·9 tons

This yield for so dry a season must be considered satisfactory.

8. WORK OF THE SOUTHERN SUGAR EXPERIMENT STATION AT BUNDABERG.

Mr. J. Pringle, the Chemist in Charge at Bundaberg, is to be commended for the care and attention given to his Station and the analytical and field work performed by him. The field staff —Messrs. A. E. Evans (foreman) and C. V. E. Olsen (teamster)—carry out their duties in a most satisfactory way. The tables and notes in connection with the performance of the experiments laid out by the Director appearing in this section of the report have been prepared by the Chemist in Charge.

Meteorological.

The weather conditions during the period from August, 1925, to March, 1926, could not be regarded as favourable for the growth of cane, since following on a cold winter adverse conditions prevailed up till the middle of December, during which time the cane made but little progress. After a fall of 5·09 inches at the end of the latter month, followed by a further fall of 3·69 inches at the beginning of January, rapid growth was made for a short period, but, owing to a dry, hot spell from the 6th January to the 10th February, the cane suffered a check, but progress was not altogether stopped, and after a fall of 1·5 inches good growth was made, especially in the autumn and spring plant, and ratoons of cane cut early in the season; but the late ratoons were backward and did not respond to the favourable conditions to the same extent as the early ratoons, which seems to suggest that very late cutting has a retarding effect on the ratooning. Following this there was a further dry period of about one month and the growth was again checked, but the cane made a quick recovery as a result of favourable conditions towards the end of March, and good progress was made until cold weather at the end of April retarded the growth, and though 11 inches were recorded in May it was of little value to the crops as the atmosphere was cool and progress slow.

The past winter was cold and dry, and a few fairly severe frosts did considerable damage to the cane in low areas.

The spring months of this year were also dry, and a poor strike has been obtained in the spring planting, which, unless rain comes shortly, will have a serious effect on the tonnages for next season.

Rainfall at the Southern Sugar Experiment Station, Bundaberg, during the Growing Period.

Month.	Rainfall.	No. of Wet Days.
August, 1925	1·39	4
September, 1925	0·42	3
October, 1925	0·77	2
November, 1925	1·14	6
December, 1925	7·26	10
January, 1926	4·41	8
February, 1926	3·10	4
March, 1926	4·13	10
April, 1926	1·33	6
May, 1926	11·00	7
June, 1926	1·50	5
July, 1926	0·13	2
August, 1926	0·03	1
September, 1926	1·37	11
October, 1926	0·85	2
Total	38·83	81

Experiments Dealt with in this Section of the Report.

(1) Conclusion of experiments with mixed manures containing a heavy dressing of potash. Q. 813—second ratoons.

(2) Conclusion of experiments testing uniformity of soil. D. 1135—first ratoons.

(3) Continuation of experiments with sulphate of lime (gypsum) in place of carbonate of lime. D. 1135—first ratoons.

(4) Continuation of experiments with green manure followed by cane. D. 1135—first ratoons.

(5) Conclusion of competitive trials with seven new varieties from Mauritius. First ratoon crop.

(6) Fertilising experiment No. 1, with meatworks in drill. Q. 813—plant crop.

(7) Fertilising experiment No. 2—potash trials. Q 813—plant crop.

(8) Analytical examination of varieties from Java, Hawaii, and Philippine Islands. First ratoon crop.

(9) Analytical examination of new varieties from Coimbatore (South India), Taru (India), and Hawaii. Plant crop.

(10) Analytical examination of canes from Mauritius, Hawaii, Java, and Philippine Islands. First ratoon crop (standover).

1. Conclusion of Experiments with Mixed Manure containing a Heavy Dressing of Potash. Q 813—Second Ratoons. Grown on Poor Land.

After harvesting the first ratoon crop at the beginning of August, 1925, each plot was ratooned uniformly, but on account of adverse conditions during the following four months the ratoons were slow in coming away, particularly the unmanured plot, where a number of stools died out. In the middle of November the manures were carefully applied to Plots 1 and 3, at the following rate per acre:—100 lb. sulphate of ammonia, 100 lb. nitrate of soda, 200 lb. sulphate of potash, and 200 lb. meatworks. Owing to a continuance of dry weather, progress was slow, but after a good fall of 5·09 inches at the end of December the cane in the two manured plots commenced to grow vigorously, while Plot No. 2, recovering slowly from the effects of the dry conditions, made poor headway, and was patchy. A further dry spell again checked the growth, which during the rest of the growing period could not be regarded as vigorous, Plot 2 being stunted and yellow, while the other two plots, though green and healthy in appearance, did not make rapid growth owing to lack of moisture followed by cold atmosphere.

The growth on Plot 2 showed the lack of potash in a most marked manner, as the crop results will show.

The analytical and crop results are now appended.

8. Southern Sugar Experiment Station—*continued.*

Analytical Examination of Experiments with Manures containing a Heavy Dressing of Potash on Poor Soil. Q. 813. Second Ratoon Crop—September, 1926.

Division.	Plot Number.	Variety of Cane.	Treatment.	Age of Cane.	Date of Analysis.	Density of Juice (Brix.).	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.	% Sucrose in Cane.	% C.C.S. in Cane.
E. 4	1	Q. 813	600 lb. mixed manure per acre containing 100 lb. sulphate of ammonia, 100 lb. nitrate of soda, 200 lb. sulphate of potash, and 200 lb. meatworks manure	13 months	1–9–26	21·0	19·59	·53	93·3	16·45	15·65
E. 4	2	Q. 813	No manure	13 months	1–9–26	18·1	16·25	1·09	89·7	13·65	12·70
E. 4	3	Q. 813	600 lb. mixed manure per acre containing 100 lb. sulphate of ammonia, 100 lb. nitrate of soda, 200 lb. sulphate of potash, and 200 lb. meatworks manure	13 months	1–9–26	19·6	18·27	·67	93·2	15·35	14·59

Crop Results of Experiments with Manures containing a Heavy Dressing of Potash on Poor Soil. Q. 813. Second Ratoon Crop—September, 1926.

Division.	Plot Number.	Variety of Cane.	Treatment.	Age of Cane.	Weight of Cane per Acre in English Tons.	Yield of Commercial Cane Sugar per Acre in English Tons.
E. 4 ..	1	Q. 813	600 lb. mixed manure per acre containing 100 lb. sulphate of ammonia, 100 lb. nitrate of soda, 200 lb. sulphate of potash, and 200 lb. meatworks manure	13 months	8·05	1·26
E. 4 ..	2	Q. 813	No manure	13 months	1·34	·17
E. 4 ..	3	Q. 813	600 lb. mixed manure per acre containing 100 lb. sulphate of ammonia, 100 lb. nitrate of soda, 200 lb. sulphate ofpotash, and 200 lb. meatworks manure	13 months	8·44	1·23

Although the yield was very low for the second ratoon crop, the manures gave an average increase of almost seven tons, Plot 2 being so low in tonnage as to be not worth cutting for the mill.

In the tables shown hereunder the analytical and crop results to date are given:—

Analytical Results to date of Experiments with Manures containing a Heavy Dressing of Potash in Poor Soil.

Division.	Plot Number.	Variety of Cane.	Treatment.	Plant Crop, 1924—Age 12 Months.	First Ratoon Crop, 1925—Age 11 Months.	Second Ratoon Crop, 1926—Age 13 Months.	Average for Three Crops.
				% Commercial Cane Sugar in Cane.	% Commercial Cane Sugar in Cane.	% Commercial Cane Sugar in Cane.	% Commercial Cane Sugar in Cane.
E. 4	1	Q. 813	1924.—550 lb. mixed manure per acre containing 100 lb. sulphate of ammonia, 100 lb. nitrate of soda, 200 lb. sulphate of potash, and 150 lb. meatworks manure 1925-6.—600 lb. mixed manure per acre containing 100 lb. sulphate of ammonia, 100 lb. nitrate of soda, 200 lb. sulphate of potash, and 200 lb. meatworks manure	15·98	15·03	15·65	15·55
E. 4	2	Q. 813	No manure	16·89	15·23	12·70	14·94
E. 4	3	Q. 813	1924.—550 lb. mixed manure per acre, containing 100 lb. sulphate of ammonia, 100 lb. nitrate of soda, 200 lb. sulphate of potash, and 150 lb. meatworks manure 1925-6.—600 lb. mixed manure per acre, containing 100 lb. sulphate of ammonia, 100 lb. nitrate of soda, 200 lb. sulphate of potash, and 200 lb. meatworks manure	16·44	15·04	14·59	15·38

8. Southern Sugar Experiment Station—*continued.*

Total Crop Results of Experiments with Manures containing a Heavy Dressing of Potash on Poor Soil.

Division	Plot Number.	Variety of Cane.	Treatment.	Plant Crop, 1924. Age Twelve Months.		First Ratoon Crop, 1925. Age Eleven Months.		Second Ratoon Crop, 1926, Age Thirteen Months.		Total Results for Three Crops.		Average for Three Crops.	
				Weight of Cane per Acre in English Tons.	Yield of C.C.S. per Acre in English Tons.	Weight of Cane per Acre in English Tons.	Yield of C.C.S. per Acre in English Tons.	Weight of Cane per Acre in English Tons.	Yield of C.C.S. per Acre in English Tons.	Weight of Cane per Acre in English Tons.	Yield of C.C.S. per Acre in English Tons.	Weight of Cane per Acre in English Tons.	Yield of C. C.S. per Acre in English Tons.
E. 4	1	Q. 813	1924.—550 lb. mixed manure per acre containing 100 lb. sulphate of ammonia, 100 lb. nitrate of soda, 200 lb. sulphate of potash, and 150 lb. meatworks manure 1925-26.—600 lb. mixed manure containing 100 lb. sulphate of ammonia, 100 lb. nitrate of soda, 200 lb. sulphate of potash, and 200 lb. meatworks manure	15·44	2·47	25·29	3·80	8·05	1·26	48·78	7·53	16·26	2·51
E. 4	2	Q. 813	No manure	13·71	2·32	16·18	2·46	1·34	·17	31·23	4·95	10·41	1·65
E. 4	3	Q. 813	1924.—550 lb. mixed manure per acre containing 100 lb. sulphate of ammonia, 100 lb. nitrate of soda, 200 lb. sulphate of potash, and 150 lb. meatworks manure 1925-26.—600 lb. mixed manure per acre containing 100 lb. sulphate of ammonia, 100 lb. nitrate of soda, 200 lb. sulphate of potash, and 200 lb. meatworks manure	16·67	2·74	27·91	4·19	8·44	1·23	53·02	8·16	17·67	2·72

This experiment, which is now concluded, demonstrates the need of potash in these soils. The increase for the use of manures in the average tonnage of the three crops taking the average of Plots 1 and 3 amounts to 6·55 tons of cane.

2. Conclusion of Experiments Testing the Uniformity of the Soil. D. 1135—First Ratoons (standover)—

On the removal of the plant crop at the beginning of December, 1924, each plot was ratooned by the usual method, and the cane came away splendidly. One month after ratooning mixed manure was applied to Plots 5, 6, 7, and 8 at the following rate per acre:—100 lb. sulphate of ammonia, 150 lb. nitrate of soda, 150 lb. sulphate of potash, and 200 lb. meatworks. All plots grew vigorously until retarded by dry, cold weather in April, 1925; Plots 1 to 4 entirely stopped growing, while the other four continued to make slow progress well into June. The cane not being sufficiently forward to warrant cutting was allowed to stand over. As the soil was in a moist condition, the cane commenced to grow again at the beginning of August, Plots 5 to 8 being well in the lead. No manure was applied in 1925. The growth was again checked by dry conditions during the following four months, and it was not until after the fall of 5 inches in December that any real progress was made, the unmanured plots taking some time to recover. All plots made good headway until retarded by adverse weather during the early months of 1926.

8. Southern Sugar Experiment Station—*continued.*

The analytical and crop results are set out below:—

Analytical Examination of Experiments Testing Uniformity of Soil. D. 1135. First Ratoon Crop—August, 1926.

Division.	Plot Number.	Variety of Cane.	Treatment.	Age of Cane.	Date of Analysis.	Density of Juice (Brix).	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.	% Sucrose in Cane.	% C.C.S. in Cane.
B. 4	1	D. 1135	No manure	22 months	18-8-26	16·9	14·82	·97	87·7	12·45	11·42
B. 4	2	D. 1135	No manure	22 months	18-8-26	19·2	17·21	·66	89·6	14·46	13·43
B. 4	3	D. 1135	No manure	22 months	18-8-26	18·0	16·03	·91	89·0	13·46	12·47
B. 4	4	D. 1135	No manure	22 months	18-8-26	18·8	17·06	·59	90·7	14·33	13·40
B. 4	5	D. 1135	600 lb. mixed manure per acre containing 100 lb. sulphate of ammonia, 150 lb. nitrate of soda, 150 lb. sulphate of potash, and 200 lb. meatworks manure	22 months	18-8-26	19·4	17·58	·56	90·6	14·77	13·79
B. 4	6	D. 1135	600 lb. mixed manure per acre, as in Plot 5	22 months	18-8-26	19·8	18·23	·43	92·0	15·31	14·48
B. 4	7	D. 1135	600 lb. mixed manure per acre, as in Plot 5	22 months	18-8-26	20·4	18·91	·32	92·7	15·88	15·05
B. 4	8	D. 1135	600 lb. mixed manure per acre, as in Plot 5	22 months	18-8-26	20·0	18·44	·43	92·2	15·49	14·65

Crop Results of Experiments Testing the Uniformity of the Soil. D. 1135. First Ratoon Crop—August, 1926.

Division.	Plot Number.	Variety of Cane.	Treatment.	Age of Cane.	Yield of Cane per Acre in English Tons.	Yield of Commercial Cane Sugar per Acre in English Tons.
B. 4	1	D. 1135..	No manure	22 months	13·39	1·53
B. 4	2	D. 1135..	No manure	22 months	9·55	1·28
B. 4	3	D. 1135..	No manure	22 months	12·22	1·52
B. 4	4	D. 1135..	No manure	22 months	14·56	1·94
B. 4	5	D. 1135..	600 lb. mixed manure per acre, containing 100 lb. sulphate of ammonia, 150 lb. nitrate of soda, 150 lb. sulphate of potash, and 200 lb. meatworks manure	22 months	29·00	4·00
B. 4	6	D. 1135..	600 lb. mixed manure per acre, as in Plot 5	22 months	26·45	3·83
B. 4	7	D. 1135..	600 lb. mixed manure per acre, as in Plot 5	22 months	29·84	4·42
B. 4	8	D. 1135..	600 lb. mixed manure per acre, as in Plot 5	22 months	30·17	4·42

From the crop results it will be seen that the manure gave excellent results. The experiment was originally laid down to try and secure more exact knowledge as to the differences in the soil, and it will be seen from the variations in the two series of four plots that this was necessary. By taking the averages, however, fair conclusions should be warranted. In the first ratoon crop shown above, the average of the four unmanured plots was 12·41 tons of cane per acre and 1·56 tons of sugar per acre, while the average yield of the four manured plots was 28.74 tons of cane per acre and 4·16 tons of sugar per acre. This gives an increase for the use of 600 lb. of mixed fertiliser, of 16·33 tons of cane per acre and 2·60 tons of sugar per acre, a particularly fine result and a most payable one, the cost of the manure and its application being about £4 5s. per acre.

The table now following gives the total and average crop results to date. This experiment is now concluded:—

8. Southern Sugar Experiment Station—*continued.*

Total Crop Results of Experiments Testing the Uniformity of the Soil.

Division.	Plot Number.	Variety of Cane.	Treatment.	Plant Crop—1924 Aged 14 months.		First Ratoon Crop—1926. Age 22 months.		Total Results of Two Crops.		Average for Two Crops.	
				Weight of Cane per acre in English Tons.	Yield of C.C.S. per acre in English Tons.	Weight of Cane per acre in English Tons.	Yield of C.C.S. per acre in English Tons.	Weight of Cane per acre in English Tons.	Yield of C.C.S. per acre in English Tons.	Weight of Cane per acre in English Tons.	Yield of C.C.S. per acre in English Tons.
B. 4	1	D. 1135..	No manure	15·50	2·17	13·39	1·53	28·89	3·70	14·44	1·85
B. 4	2	D. 1135..	No manure	13·78	2·02	9·55	1·28	23·33	3·30	11·66	1·65
B. 4	3	D. 1135 ..	No manure	16·33	2·26	12·22	1·52	28·55	3·78	14·27	1·89
B. 4	4	D. 1135..	No manure	19·50	2·87	14·50	1·94	34·00	4·81	17·00	2·41
B. 4	5	D. 1135..	600 lb. mixed manure per acre containing 100 lb. sulphate of ammonia, 150 lb. nitrate of soda, 150 lb. sulphate of potash, and 200 lb. meatworks manure	21·28	3·23	29·00	4·00	50·28	7·23	25·14	3·61
B. 4	6	D. 1135..	600 lb. mixed manure per acre, as in Plot 5	17·89	2·73	26·45	3·83	44·34	6·56	22·17	3·28
B. 4	7	D. 1135..	600 lb. mixed manure per acre, as in Plot 5	18·00	2·72	29·34	4·42	47·34	7·14	23·67	3·57
B. 4	8	D. 1135 ..	600 lb. mixed manure per acre, as in Plot 5	18·12	2·75	30·17	4·42	48·39	7·17	24·19	3·58

The average of the plant and first ratoon crop does not disclose such large differences between manured and unmanured plots as in the first ratoon, but it amounts to an increased yield of 9·45 tons of cane per acre. The results of the standover first ratoons show the wisdom of the application of manures to standover crops.

The disparity in results between contiguous plots shows the necessity for carrying out experiments in duplicate.

3. Continuation of Experiments with Sulphate of Lime (Gypsum) in place of Carbonate of Lime. D. 1135—First Ratoons.

The plant crop was cut about the middle of September, 1925, and two weeks later each plot was ratooned by ploughing three furrows between the rows and levelling down with the cultivator. The cane came away well but owing to dry weather the growth was slow. On the 18th December mixed manure was applied to each plot, at the rate of 100 lb. sulphate of ammonia, 100 lb. nitrate of soda, 75 lb. sulphate of potash, and 100 lb. meatworks per acre. The application was made a few days previous to a rainfall of 5 inches, and the cane taking advantage of the manure grew vigorously till checked by dry conditions towards the end of January and the following month. Each plot was apparently uniform both in growth and colour. During the last week in March the cane made good headway, but this was again retarded by dry cold weather in April, and but little progress was made up to time of cutting.

Previous reports have shown that no results have ever been achieved at the Bundaberg Sugar Experiment Station for the use of lime oxide or lime carbonate. A trial is therefore being now made with sulphate of lime (gypsum). Last year, in the plant crop, negative results were given; in fact the "No lime" plot gave the highest returns. This has been repeated in the first ratoon crop, as will be seen from the tables of crop results which, with the analytical data, are presented below:—

Analytical Examination of Experiments with Sulphate of Lime (Gypsum) in place of Carbonate of Lime. First Ratoon Crop—September, 1926.

Division.	Plot Number.	Variety.	Treatment.	Age of Cane.	Date of Analysis.	Density of Juice (Brix).	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.	% Sucrose in Cane.	% C.C.S. in Cane.
B. 2	1	D. 1135..	One ton sulphate of lime per acre	12 months	6–9–26	20·2	18·89	·42	93·5	15·87	15·11
B. 2	2	D. 1135..	Two tons sulphate of lime per acre	12 months	6–9–26	20·0	18·69	·39	93·4	15·70	14·95
B. 2	3	D. 1135 ..	No lime	12 months	6–9–26	19·4	17·85	·48	92·0	14·99	14·15

8. Southern Sugar Experiment Station—*continued.*

Crop Results of Experiments with Sulphate of Lime (Gypsum) in place of Carbonate of Lime. First Ratoon Crop—September, 1926.

Division.	Plot Number.	Variety.	Treatment.	Age of Cane.	Weight of Cane per Acre in English Tons.	Yield of Commercial Cane Sugar per Acre in English Tons.
B. 2..	1	D. 1135 ..	One ton sulphate of lime per acre	12 months	14·25	2·15
B. 2..	2	D. 1135 ..	Two tons sulphate of lime per acre	12 months	14·85	2·12
B. 2..	3	D. 1135 ..	No lime	12 months	15·37	2·17

The crop results to date are as follows:—

Crop Results to date of Experiments with Sulphate of Lime (Gypsum) in place of Carbonate of Lime.

Division.	Plot Number.	Variety of Cane.	Treatment.	Plant Crop, 1925—Age 12 Months.		First Ratoon Crop, 1926—Age 12 Months.		Average for Two Crops.	
				Weight of Cane per Acre in English Tons.	Yield of Commercial Cane Sugar per Acre in English Tons.	Weight of Cane per Acre in English Tons.	Yield of Commercial Cane Sugar per Acre in English Tons.	Weight of Cane per Acre in English Tons.	Yield of Commercial Cane Sugar per Acre in English Tons.
B. 2	1	D. 1135 ..	One ton of sulphate of lime per acre	22·81	3·31	14·25	2·15	18·52	2·73
B. 2	2	D. 1135..	Two tons sulphate of lime per acre	23·81	2·28	14·85	2·12	19·33	2·20
B. 2	3	D. 1135 ..	No lime	25·21	3·71	15·37	2·17	20·29	2·94

4. Continuation of Experiments with Green Manure followed by Cane. D. 1135—First Ratoons.

After taking off the plant crop at the beginning of September, 1925, each plot was ratooned in the usual manner, and the cane came away in a vigorous and healthy manner. These ratoons were not fertilised. Owing to dry conditions the cane made little progress during the three months after ratooning, but commenced to grow rapidly in response to favourable conditions towards the end of December. Growth was again checked for about two months from the middle of January; afterwards progress was slow until completely checked by cold weather. During the period of growth no difference was noticed in any of the plots.

In the preparation of this land before planting cowpea, Plots 1 and 4 received ordinary ploughings only, Plot 2 was subsoiled in addition, and to Plot 3 100 lb. sulphate of potash and 200 lb. of meatworks manure were applied.

Below are given the analytical and crop results of the first ratoon crop.

Analytical Examination of Experiments with Green Manure followed by Cane. D. 1135. First Ratoon Crop—August, 1926.

Division.	Plot Number.	Variety of Cane.	Treatment.	Age of Cane.	Date of Analysis.	Density of Juice (Brix).	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.	% Sucrose in Cane.	% C.C.S. in Cane.
E. 3	1	D. 1135	Ordinary ploughing; cowpea planted	12 months	30–8–26	19·8	17·95	·72	90·6	15·08	14·10
E. 3	2	D. 1135	Ploughed and subsoiled; cowpea planted	12 months	30–8–26	20·4	18·61	·60	92·1	15·63	14·78
E. 3	3	D. 1135	Ordinary ploughing, but fertilised with 100 lb. sulphate of potash and 200 lb. meatworks manure per acre applied broadcast previous to planting cowpea	12 months	30–8–26	20·6	19·30	·49	93·7	16·21	15·46
E. 3	4	D. 1135	Ordinary ploughing; cowpea planted	12 months	30–8–26	20·7	18·63	·61	90·0	15·65	14·57

8. Southern Sugar Experiment Station—*continued.*

Crop Results of Experiments with Green Manure followed by Cane. D. 1135. First Ratoon Crop—September, 1926.

Division.	Plot Number.	Variety.	Treatment.	Age of Cane.	Weight of Cane per Acre in English Tons.	Weight of Commercial Cane Sugar per Acre in English Tons.
E. 3	1	D. 1135..	Ordinary ploughing; cowpea planted	12 months	9·37	1·32
E. 3	2	D. 1135..	Ploughed and subsoiled; cowpea planted	12 months	11·03	1·63
E. 3	3	D. 1135..	Ordinary ploughing, but fertilised with 100 lb. sulphate of potash and 200 lb. meatworks manure per acre applied broadcast previous to planting of cowpea	12 months	12·32	1·90
E. 3	4	D. 1135..	Ordinary ploughing; cowpea planted	12 months	9·55	1·39

The results are in favour of the subsoiled plot and that to which the potash and meatworks were applied, and the same will be found in the total crop results to date, which appear hereunder:—

Crop Results to Date of Experiments with Green Manure followed by Cane.

Division.	Plot Number.	Variety of Cane.	Treatment.	Plant Crop—1925, Age Twelve Months.		First Ratoon Crop—1926, Age Twelve Months.		Average for Two Crops.	
				Weight of Cane per Acre in English Tons.	Yield of C.C.S. per Acre in English Tons.	Weight of Cane per Acre in English Tons.	Yield of C.C.S. per Acre in English Tons.	Weight of Cane per Acre in English Tons.	Yield of C.C.S. per Acre in English Tons.
E. 3	1	D. 1135	Ordinary ploughing; cowpea planted	20·44	2·90	9·37	1·32	14·90	2·11
E. 2	3	D. 1135	Ploughed and subsoiled; cowpea planted	24·91	3·56	11·03	1·63	17·97	2·59
E. 3	3	D. 1135	Ordinary ploughing, but fertilised with 100 lb. sulphate of potash, and 200 lb. meatworks manure applied broadcast previous to planting cowpea	24·60	3·45	12·32	1·90	18·46	2·23
E. 3	4	D. 1135	Ordinary ploughing; cowpea planted	21·73	3·04	9·55	1·39	15·64	2·21

5. Competitive Trials with Seven New Varieties from Mauritius. First Ratoon Crop.

Brief descriptions of these canes were given in the 1922 Report (page 43), also notes as to general characteristics, and a preliminary analysis. Further analyses and notes were given in the Report for 1924 (pages 47 and 48), while notes, analyses, and plant crop results were recorded in the last report.

With reference to the present crop, after the plant crop was cut at the end of September, 1925, all varieties were ratooned uniformly; the varieties R.P. 6, R.P. 8, and M. 55/453 came away splendidly, while 33/95 and 291/08 were fair, but 64/14 and 131/126 were slow and inclined to be sparse. On the 19th December, 1925, mixed manure at the rate of 50 lb. sulphate of ammonia, 150 lb. nitrate of soda, 100 lb. sulphate of potash, and 200 lb. meatworks manure per acre was applied to each variety. All varieties grew well while conditions were favourable, but 291/08 and 55/453 were in the lead, followed by R.P. 8, and 131/126 with R.P. 6, 33/95, and 64/14 in that order. In crop results R.P. 6 leads with 52·77 tons per acre for two crops, and 26·38 average; 291/08 comes next with 47·17 total and 23·58 average. This is followed by R.P. 8 with 44·6 and 22·3; then comes 55/453 and 131/126 with tonnages practically the same, and 33/95 with 31·2 total and 15·6 average; 64/14 is the lowest in tonnage but highest in quality, the average c.c.s. being 16·59.

8. Southern Sugar Experiment Station—*continued.*

The tables below set out the analytical and crop results for the first ratoon crops, and the total analytical and crops results to date:—

Analytical Examination of Competitive Trials with New Canes from Mauritius—First Ratoon Crop—September, 1926.

Division.	Country.	Name or Number of Variety.	Age of Cane.	Date of Analysis.	Density of Juice (Brix.).	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.	% Fibre in Cane.	% Sucrose in Cane.	% C.C.S. in Cane.
B. 1	Mauritius ..	R.P. 6	12 months	14–9–26	19·4	16·79	1·06	86·5	11.8	13·97	12·54
B. 1	Mauritius ..	R.P. 8	12 months	14–9–26	20·1	17.91	1·10	89·1	13·5	14·57	13·50
B. 1	Mauritius ..	33/95	12 months	14–9–26	22·0	21·10	·26	95·9	10·7	17·79	17·18
B. 1	Mauritius ..	55/453	12 months	14–9–26	21·3	18·68	1·15	87·6	11·0	15·09	14·38
B. 1	Mauritius ..	64/14	12 months	14–9–26	22·2	21·36	·31	96·2	12·0	17·73	17·16
B. 1	Mauritius ..	131/126 ..	12 months	14–9–26	19·1	17·35	1·44	90·6	11·0	14·57	13·66
B. 1	Mauritius ..	291/08	12 months	14–9–26	21·0	19·37	1·22	92·2	12·6	16·06	15·23

Crop Results of Competitive Trials with New Canes from Mauritius. First Ratoon Crop—September, 1926.

Division.	Country.	Name or Number of Variety.	Age of Cane.	Weight of Cane per Acre in English Tons.	Yield of Commercial Cane Sugar per Acre in English Tons.
B. 1 ..	Mauritius	R.P. 6	12 months	16·58	2·08
B. 1 ..	Mauritius	R.P. 8	12 months	14·21	1·92
B. 1 ..	Mauritius	33/95	12 months	10·50	1·80
B. 1 ..	Mauritius	55/453	12 months	12·13	1·74
B. 1 ..	Mauritius	64/14	12 months	8·59	1·47
B. 1 ..	Mauritius	131/126	12 months	10·31	1·41
B. 1 ..	Mauritius	291/08	12 months	13·16	2·00

Analytical Results to Date of Competitive Trials with New Canes from Mauritius.

Division.	Country.	Name or Number of Variety.	Plant Crop—1925 Age 14 months.	First Ratoon Crop—1926 Age 12 months.	Average for Two Crops.
			% Commercial Cane Sugar in Cane.	% Commercial Cane Sugar in Cane.	% Commercial Cane Sugar in Cane.
B. 1 ..	Mauritius	R.P. 6	14·93	12·54	13·73
B. 1 ..	Mauritius	R.P. 8	12·57	13·50	13·00
B. 1 ..	Mauritius	33/95	13·87	17·18	15·52
B. 1 ..	Mauritius	55/453	13·65	14·38	14·01
B. 1 ..	Mauritius	64/14	16·03	17·16	16·59
B. 1 ..	Mauritius	131/126	13·56	13·66	13·61
B. 1 ..	Mauritius	291/08	12·84	15·23	14·03

Total Crop Results of Competitive Trials with New Canes from Mauritius.

Division.	Country.	Name or Number of Variety.	Plant Crop, 1925—Age, 14 Months.		First Ratoon Crop, 1926—Age, 12 Months.		Total Results for Two Crops.		Average for Two Crops.	
			Weight of Cane per Acre in English Tons.	Yield of C.C.S. per Acre in English Tons.	Weight of Cane per Acre in English Tons.	Yield of C.C.S. per Acre in English Tons.	Weight of Cane per Acre in English Tons.	Yield of C.C.S. per Acre in English Tons.	Weight of Cane per Acre in English Tons.	Yield of C.C.S. per Acre in English Tons.
B. 1	Mauritius	R.P. 6	36·19	5·40	16·58	2·08	52·77	7·48	26·38	3·74
B. 1	Mauritius	R.P. 8	30·39	3·82	14·21	1·92	44·60	5·74	22·30	2·87
B. 1	Mauritius	33/95	20·70	2·87	10·50	1·80	31·20	4·67	15·60	2·33
B. 1	Mauritius	55/453	26·09	3·56	12·13	1·74	38·22	5·30	19·11	2·65
B. 1	Mauritius	64/14	19·89	3·19	8·59	1·47	28·48	4·66	14·24	2·33
B. 1	Mauritius	131/126	28·27	3·83	10·31	1·41	38·58	5·24	19·29	2·62
B. 1	Mauritius	291/08	34·01	4·36	13·16	2·00	47·17	6·36	23·58	3·18

8. Southern Sugar Experiment Station—*continued.*

6. Fertilising Experiment. Q. 813 Plant Crop.

Plot 1—No manure.

Plot 2—300 lb. meatworks manure per acre applied in the drills with the plants, and 269 lb. mixed manure, containing 119 lb. sulphate of ammonia and 150 lb. sulphate of potash per acre, applied to each side of row three months later.

Plot 3—650 lb. mixed manure, containing 200 lb. sulphate of ammonia, 150 lb. sulphate of potash, and 300 lb. meatworks manure per acre, applied three months after planting, being equivalent amounts of nitrogen, potash, and phosphoric acid as applied in Plot 2.

Plot 4—No manure.

Plot 5—Manure as applied in Plot 2.

Plot 6—Manures as applied in Plot 3.

These experiments are being carried out in duplicate; Plots 2 and 3 and Plots 5 and 6 have the same elements, but the manner of application was different. The object was to see if the application of meatworks in the drills with the plants would give better results than in applying the manure in the usual way at the side of the drills.

In preparing the land for this experiment the old stools of the previous crop were ploughed out in October, 1924, and harrowed; the block was sown with cowpea, using the seed planter, at the rate of 20 lb. per acre at the end of the same month. The pea germinated well, and at the beginning of March, 1925, a fairly good crop of green manure was turned under, and allowed to decay. After receiving two further cross-ploughings and harrowings, making four in all including the ploughing out, the plots were laid out and planted in August with plants from the Station. Owing to dry conditions the strike was slow but ultimately good. At time of planting, 300 lb. meatworks manure were applied in the drills with the plants in Plots 2 and 5, and three months later 119. lb. sulphate of ammonia and 150 lb. sulphate of potash were applied to each side of the row. Plots 3 and 6 received an application of mixed manure at the rate of 650 lb. per acre, containing 200 lb. sulphate of ammonia, 150 lb. sulphate of potash, and 300 lb. meatworks manure, applied to each side of the row three months after planting, this being equivalent amounts of nitrogen, potash, and phosphoric acid as applied to Plots 2 and 5. During the growing period for a considerable time all plots appeared uniform, but in February there was a distinct falling away in Plot 1 (unmanured), which is 3·85 tons per acre less than the other unmanured plot.

In the tables below the analytical data and results of the plant crop are furnished:—

Analytical Examination of Fertilising Experiment No. 1. Q. 813. Plant Crop—October, 1926.

Division.	Plot Number.	Variety of Cane.	Treatment.	Age of Cane.	Date of Analysis.	Density of Juice (Brix).	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.	% Sucrose in Cane.	% C.C.S. in Cane.
B. 3	1	Q. 813	No manure	13 months	4–10–26	18·7	17·81	·59	95·2	14·96	14·41
B. 3	2	Q. 813	300 lb. meatworks manure per acre applied in drills with plants and 119 lb. sulphate of ammonia and 150 lb. sulphate of potash applied 3 months later to each side of row	13 months	4–10–26	17·9	16·85	·64	94·3	14·15	13·54
B. 3	3	Q. 813	650 lb. mixed manure per acre containing 200 lb. sulphate of ammonia, 150 lb. sulphate of potash, and 300 lb. meatworks manure applied to each side of row 3 months after planting; being equivalent amounts of nitrogen, potash, and phosphoric acid as applied in Plot 2	13 months	4–10–26	17·7	16·44	·64	92·8	13·81	13·12
B. 3	4	Q. 813	No manure	13 months	4–10–26	17·4	16·18	·81	93·0	13·59	12·89
B. 3	5	Q. 813	Manures applied as in Plot 2	13 months	4–10–26	17·1	15·78	·71	92·2	13·25	12·53
B. 3	6	Q. 813	Manures applied as in Plot 3	13 months	4–10–26	16·6	15·16	·73	91·3	12·73	11·96

8. Southern Sugar Experiment Station—*continued.*

Crop Results of Fertilising Experiment No. 1. Q. 813. Plant Crop—October, 1926.

Division.	Plot Number.	Variety of Cane.	Treatment.	Age of Cane.	Weight of Cane per Acre in English Tons.	Yield of Commercial Cane Sugar per Acre in English Tons.
B. 3	1	Q. 813 ..	No manure	13 months	7·02	1·01
B. 3	2	Q. 813 ..	300 lb. meatworks manure per acre applied in drills with plants and 119 lb. sulphate of ammonia, and 150 lb. sulphate of potash, applied 3 months later at sides of rows	13 months	10·35	1·40
B. 3	3	Q. 813 ..	650 lb. mixed manure per acre containing 200 lb. sulphate of ammonia, 150 lb. sulphate of potash, and 300 lb. meatworks manure, applied 3 months after planting, being equivalent amounts of nitrogen, potash, and phosphoric acid, as applied in Plot 2, at sides of rows	13 months	10·61	1·39
B. 3	4	Q. 813 ..	No manure	13 months	10·87	1·41
B. 3	5	..	Manures applied as in Plot 2	13 months	12·90	1·59
B. 3	6	Q. 813 ..	Manures applied as in Plot 3	13 months	12·06	1·44

The average of Plots 2 and 5, where the meatworks manure was applied in the drill, was 11·62 tons of cane per acre, and of Plots 3 and 6, where the fertilisers were applied in the ordinary way, 11·33 tons of cane per acre. The average of the no manure plots was 8·94. The application of meatworks in the drill is only very slightly ahead. The increase for manure is not great, being only 2·53 tons of cane per acre, due to its being a plant crop.

7. Fertiliser Experiment No. 2. (Potash Trials) Q. 813—Plant Crop.

Plot 1—700 lb. mixed manure per acre, containing 100 lb. sulphate of ammonia, 500 lb. sulphate of potash, and 100 lb. meatworks manure.

Plot 2—500 lb. sulphate of potash per acre.

Plot 3—No manure.

Plot 4—No manure.

Plot 5—500 lb. sulphate of potash per acre.

Plot 6—700 lb. mixed manure per acre, containing 100 lb. sulphate of ammonia, 500 lb. sulphate of potash, and 100 lb. meatworks manure.

This experiment was laid down to further test the action of potash on the red soils. The preparatory work was as follows:—

The old stools were ploughed out in December, 1924, and the land harrowed, and planted with cowpea with the seed planter, at the rate of 20 lb. per acre, in the middle of January, 1925; the germination was good, but owing to the bean borer, only a small crop of green manure was turned under towards the end of March. After receiving two further cross ploughings and harrowings, the plots were laid out and the cane planted in the beginning of September. The strike was slow, but finally fairly good, only a few misses having to be filled in. As the cane was slow in germination, the manuring was held up till the middle of December. In February the dry weather caused the two unmanured plots to fall off both in growth and colour, while those receiving fertilisers, though checked in growth, retained a good healthy colour. The difference in tonnage between the manured and unmanured plots was due more to thickness of stick and better stooling in the former than to length of stick.

The analytical and crop results are contained in the following tables:—

Analytical Examination of Fertilising Experiment (Potash Trials). Q. 813. Plant Crop—October, 1926.

Division.	Plot Number.	Variety of Cane.	Treatment.	Age of Cane.	Date of Analysis.	Density of Juice (Brix).	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.	% Sucrose in Cane.	% of C.C.S. in Cane
E. 1	1	Q. 813	700 lb. mixed manure per acre containing 100 lb. sulphate of ammonia, 500 lb. sulphate of potash, and 100 lb. meatworks manure	13 months	7–10–26	20.9	19·56	·55	93·5	16·43	15·65
E. 1	2	Q. 813	500 lb. sulphate of potash per acre	13 months	7–10–26	22·0	21·10	·34	95·9	17·72	17·13
E. 1	3	Q. 813	No manure	13 months	7–10–26	20·0	19·06	·50	95·3	16·01	15·42
E. 2	4	Q. 813	No manure	13 months	7–10–26	20·0	19·17	·57	95·8	16·10	15·55
E. 2	5	Q. 813	500 lb. sulphate of potash per acre	13 months	7–10–26	19·6	18·68	·51	95·3	15·69	15·10
E. 2	6	Q. 813	700 lb. mixed manure per acre, containing 100 lb. sulphate of ammonia, 500 lb. sulphate of potash, and 100 lb. meatworks manure	13 months	7–10–26	20·0	18·79	·59	93·9	15·78	15·07

8. Southern Sugar Experiment Station—*continued.*

Crop Results of Manurial Experiments. Q. 813. Plant Crop—October, 1926.

Division.	Plot Number.	Variety of Cane.	Treatment.	Age of Cane.	Yield of Cane per Acre in English Tons.	Yield of Commercial Cane Sugar per Acre in English Tons.
E. 1	1	Q. 813 ..	700 lb. mixed manure per acre containing 100 lb. sulphate of ammonia, 500 lb. sulphate of potash, and 100 lb. meatworks manure	13 months	7·58	1·23
E. 1	2	Q. 813 ..	500 lb. sulphate of potash per acre	13 months	8·73	1·49
E. 1	3	Q. 813 ..	No manure	13 months	5·23	·81
E. 2	4	Q. 813 ..	No manure	13 months	6·71	1·04
E. 2	5	Q. 813 ..	500 lb. sulphate of potash per acre	13 months	10·24	1·54
E. 2	6	Q. 813 ..	700 lb. mixed manure per acre containing 100 lb. sulphate of ammonia, 500 lb. sulphate of potash, and 100 lb. meatworks manure	13 months	8·47	1·28

The results of this experiment are, so far, slightly in favour of potash alone compared with mixed fertilisers. The average of the plots on which potash alone was tried was 9·48 tons of cane per acre, as against 8·02 tons of cane per acre for mixed manures, and 5.97 tons of cane per acre for no manure. The yields are very low for a plant crop and are due to the exceedingly dry time experienced. The results in the ratoon crops should be much more satisfactory as far as the action of the manures is concerned.

8. Analytical Examination of Varieties from Java, Hawaii, and Philippine Islands. First Ratoon Crop.

Brief descriptions of these varieties, together with analytical and crop results, were given in the report for 1925, also notes as to general behaviour.

With regard to the present crop from which samples were taken, it was originally a competitive experiment, but owing to an outbreak of gum the following varieties were thrown out:—S.W. 3, D.I. 52, 90 F., H. 456, H. 468, H. 472, H. 1801, H. 5803, and H. 27, and the experiment discarded.

Of the canes included in the analytical tables, P.O.J. 213 and Striped Tip ratooned well and made the best growth, followed by Luzon 2, and Luzon 4, while P.O.J. 2714 made a poor ratoon but good growth, and P.O.J. 100 good ratoon and fair growth. All of the above varieties were more or less gummed when cut and have been discarded.

The following tables comprise the preliminary, progressive, and final analyses of these varieties:—

Preliminary Analytical Examination of Canes from Java, Hawaii, and Philippine Islands. First Ratoon Crop—July, 1926.

Division.	Country.	Name or Number of Variety.	Age of Cane.	Date of Analysis.	Density of Juice (Brix).	% Sucrose in Juice.	Purity of Juice.	% Fibre in Cane.	% Sucrose in Cane.	% C.C.S. in Cane.
E. 4	Java	P.O.J. 100	9 months	27–7–26	18·7	17·09	91·9	10·5	14·44	13·58
E. 4	Java	P.O.J. 213	9 months	27–7–26	19·2	17·81	92·7	13·6	14·49	13·73
E. 4	Java	P.O.J. 2714 ..	9 months	27–7–26	17·0	14·74	86·7	12·5	12·16	11·06
E. 4	Hawaii	Striped Tip	9 months	27–7–26	20·0	18·69	93·4	13·4	15·25	14·52
E. 4	Philippine ..	Luzon 2	9 months	27–7–26	18·2	16·99	93·3	9·8	14·47	13·77
E. 4	Philippine ..	Luzon 4	9 months	27–7–26	18·9	17·02	93·1	12·1	14·11	13·15

Second Progressive Analytical Examination of Canes from Java, Hawaii, and Philippine Islands. First Ratoon Crop—August, 1926.

Division.	Country.	Name or Number of Variety.	Age of Cane.	Date of Analysis.	Density of Juice (Brix).	% Sucrose in Juice.	Purity of Juice.	% Fibre in Cane.	% Sucrose in Cane.	% C.C.S. in Cane.
E. 4	Java	P.O.J. 100	10 months	26–8–26	20·5	19·41	94·6	10·5	16·40	15·74
E. 4	Java	P.O.J. 213	10 months	26–8–26	21·1	19·77	93·7	13·4	16·13	15·38
E. 4	Java	P.O.J. 2714 ..	10 months	26–8–26	20·2	18·42	91·1	12·5	15·91	14·26
E. 4	Hawaii	Striped Tip	10 months	26–8–26	21·5	19·10	88·8	13·4	15·58	14·39
E. 4	Philippine ..	Luzon 2	10 months	26–8–26	20·1	19·12	95·1	9·8	16·29	15·68
E. 4	Philippine ..	Luzon 4	10 months	26–8–26	18·8	17·81	94·7	12·1	14·76	14·16

8. Southern Sugar Experiment Station—*continued.*

Final Analytical Examination of Canes from Java, Hawaii, and Philippine Islands. First Ratoon Crop—September, 1926.

Division.	Country.	Name or Number of Variety.	Age of Cane.	Date of Analysis.	Density of Juice (Brix).	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.	% Fibre in Cane.	% Sucrose in Cane.	% C.C.S. in Cane.
E. 4	Java	P.O.J. 100 ..	11 months	22–9–26	21·5	20·65	·49	96·0	10·5	17·45	16·88
E. 4	Java	P.O.J. 213 ..	11 months	22–9–26	21·9	20·97	·40	95·7	13·4	17·11	16·51
E. 4	Java	P.O.J. 2714 ..	11 months	22–9–26	19·9	18·55	·50	93·2	12·5	15·30	14·55
E. 4	Hawaii ..	Striped Tip ..	11 months	22–9–26	21·0	20·27	·41	96·5	13·4	16·54	16·04
E. 4	Philippine ..	Luzon 2 ..	11 months	22–9–26	21·4	20·22	·17	94·5	9·8	17·22	16·50
E. 4	Philippine ..	Luzon 4 ..	11 months	22–9–26	19·7	18·60	·56	94·3	12·1	15·43	14·78

9. Analytical Results of New Varieties from Coimbatore, South India; Taru, India; and one from Hawaii.—Plant Crop.

Brief descriptions of Co. 210, Co. 213, Co. 227, Co. 239, and Assam Red Seedling, together with a preliminary analysis, were given in last year's report.

The variety Yellow Caledonia was received, together with other varieties, on the 2nd August, 1922, in a poor condition, was carefully planted and tended, but only two eyes germinated, hence its non-appearance in previous reports. It was again planted out in August, 1924, but the strike was poor and growth slow. In August, 1925, it was given a further trial. The germination was again poor, but the growth was better.

The land on which the cane was planted had previously been used for growing maize and saccalene for some years, and from the appearance of the cane the continued growth of the latter seems to exhaust the fertility of the soil, since the cane on the portion where the saccalene was grown did not respond to favourable conditions in the same way as in other portions, and fell away rapidly during a dry spell. In preparation the land was ploughed and harrowed and sown with cowpea broadcast, at the rate of one bushel to the acre. The seed germinated well, and in March, 1925, a good crop of green manure was turned under. Afterwards, two further cross ploughings and harrowings were given and the cane planted on the 8th September. As the soil was somewhat dry the strike was slow, Co. 210 being first through on the 28th, three weeks after planting; Assam Red was next, on the 4th November, with Co. 213 and Co. 227 following on the 7th, while Co. 239 did not appear till the 10th, and Yellow Caledonia on the 23rd, six weeks after planting.

NOTES ON FOUR CANES FROM COIMBATORE; ONE FROM TARU, INDIA; AND ONE FROM HAWAII.

Co. 210 is a good striker and vigorous grower, large stooler, and strong ratooner; it is a good cropper and stands well under dry conditions. The quality is fair if cut late in the season; it could be planted either in autumn or spring, but from a quality standpoint the former may give the best results. It is slightly inclined to gum, but apparently so far resistant to mosaic.

Co. 213.—A good striker and fairly rapid grower; a good stooler and ratooner. It is a fair cropper but falls off during dry weather; the quality is high, but it is a late maturer. This variety would do best as a March plant. It is subject to both gum and mosaic.

Co. 227 is a good germinator and medium fast grower, good ratooner and big stooler, but the sticks, though numerous, are very thin. It is a fairly good cropper, but requires favourable conditions. The quality is inclined to be low. This cane would probably give best results when planted in autumn. It is slightly inclined to gum, but resistant to mosaic.

Co. 239 is a good striker under favourable conditions, but otherwise weak; is a rapid grower, good stooler and ratooner. This variety is a fairly good cropper, but does not stand up to dry conditions, having almost died out in this crop. It is a high quality cane and an early maturer. Providing the weather is favourable, it could be planted at any time; is subject to both gum and mosaic. Does not appear to be a cane suitable for this district.

Assam Red is a medium striker and vigorous grower, and is a good stooler and strong ratooner, standing up well in dry weather. The quality is high but best if cut late in the season. The best results would be obtained from autumn planting. This cane is slightly subject to both gum and mosaic. A good variety.

Yellow Caledonia.—This variety has little in its favour, as it is a poor striker, slow grower, sparse stooler, and weak ratooner. It does not in any way come up to the requirements of this district. Is a good quality cane, and fairly early maturer, and would probably give the best returns as a March plant. It is inclined to gum, but apparently resistant to mosaic. Not to be recommended for this district.

The following tables set out the preliminary, progressive, and final analytical results of the above canes:—

8. Southern Sugar Experiment Station—*continued.*

Preliminary Analytical Examination of Four New Canes from Coimbatore, South India, One New Variety from Taru, India, and One from Hawaii. Plant Crop,—July 1926.

Division.	Country.	Name or Number of Variety.	Age of Cane.	Date of Analysis.	Density of Juice (Brix).	% Sucrose in Juice.	Purity of Juice.	% Fibre in Cane.	% Sucrose in Cane.	% C.C.S. in Cane.
D.	Coimbatore ..	Co. 210	11 months	27–7–26	17·3	14·54	84·0	15·9	11·50	10·24
D.	Coimbatore ..	Co. 213	11 months	27–7–26	18·2	14·73	80·9	15·3	11·74	10·18
D.	Coimbatore ..	Co. 227	11 months	27–7–26	18·2	15·58	85·6	16·2	12·27	11·06
D.	Coimbatore ..	Co. 239	11 months	27–7–26	19·6	17·66	90·1	14·8	13·63	12·39
D.	Taru	Assam Red	11 months	27–7–26	18·7	17·74	94·0	12·5	14·63	14·10
D.	Hawaii	Yellow Caledonia ..	11 months	27–7–26	17·5	16·55	94·5	11·3	13·85	13·28

Second Progressive Analytical Examination of Four New Canes from Coimbatore, South India, One New Variety from Taru, India, and One from Hawaii. Plant Crop—August, 1926.

Division.	Country.	Name or Number of Variety.	Age of Cane.	Date of Analysis.	Density of Juice (Brix).	% Sucrose in Juice.	Purity of Juice.	% Fibre in Cane.	% Sucrose in Cane.	% C.C.S. in Cane.
D.	Coimbatore ..	Co. 210	12 months	27–8–26	19·1	16·00	83·7	15·9	12·65	11·23
D.	Coimbatore ..	Co. 213	12 months	27–8–26	19·3	16·13	83·4	15·3	12·85	11·40
D.	Coimbatore ..	Co. 227	12 months	27–8–26	20·9	18·68	89·3	16·2	14·73	13·66
D.	Coimbatore ..	Co. 239	12 months	27–8–26	21·3	19·48	91·4	14·8	15·62	14·68
D.	Taru	Assam Red	12 months	27–8–26	21·1	20·22	95·8	12·5	16·68	16·11
D.	Hawaii	Yellow Caledonian ..	12 months	27–8–26	18·5	16·99	91·8	11·3	14·22	13·41

Final Analytical Examination of Four New Canes from Coimbatore, South India, One New Variety from Taru, India, and One from Hawaii. Plant Crop—September, 1926.

Division.	Country.	Name or Number of Variety.	Age of Cane.	Date of Analysis.	Density of Juice (Brix.)	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.	% Fibre in Cane.	% Sucrose in Cane.	% C.C.S. in Cane.
D.	Coimbatore ..	Co. 210 ..	13 months	23–9–26	21·5	18·31	1·04	85·1	15·9	14·48	13·01
D.	Coimbatore ..	Co. 213 ..	13 months	23–9–26	22·0	19·97	·52	90·8	15·3	15·91	14·88
D.	Coimbatore ..	Co. 227 ..	13 months	23–9–26	21·0	19·33	·42	92·0	16·2	14·23	12·87
D.	Coimbatore ..	Co. 239 ..	13 months	23–9–26	22·8	21·12	·26	92·2	14·8	16·94	16·04
D.	Taru	Assam Red ..	13 months	23–9–26	21·0	20·13	·29	95·8	12·5	16·60	16·03
D.	Hawaii ..	Yellow Caledonian	13 months	23–9–26	20·8	19·29	1·32	92·7	11·3	16·24	15·50

The following table presents the analytical figures of certain standover varieties grown upon the Bundaberg Station:—

Analytical Examination of Canes from Mauritius, Hawaii, Java, and Philippine Islands. First Ratcon Crop (Standover)—August, 1926.

Division.	Country.	Name or Number of Variety.	Age of Cane.	Date of Analysis.	Density of Juice (Brix)	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.	% Fibre in Cane.	% Sucrose in Cane.	% C.C.S. in Cane.
Nursery	Mauritius ..	R.P. 6 ..	21 months	10–8–26	18·1	16·73	·43	92·3	11·8	13·92	13·17
Nursery	Mauritius ..	R.P. 8 ..	21 months	10–8–26	18·9	17·51	·68	92·6	13·5	14·27	13·52
Nursery	Mauritius ..	M. 33/95 ..	21 months	10–8–26	19·5	18·52	·23	94·9	10·7	15·61	15·01
Nursery	Mauritius ..	M. 55/453 ..	21 months	10–8–26	16·9	14.73	·59	87·1	11·0	12·37	11·31
Nursery	Mauritius ..	M. 64/14 ..	21 months	10–8–26	19·8	18·95	·18	95·7	12·0	15·73	15·20
Nursery	Mauritius ..	M. 291/08 ..	21 months	10–8–26	16·1	14·07	·76	87·3	12·6	11·59	10·60
Nursery	Hawaii ..	H. 472 ..	21 months	10–8–26	19·5	18·11	·25	92·8	9·3	15·52	14·63
Nursery	Hawaii ..	H. 468 ..	21 months	11–8–26	16·1	14·58	·50	90·5	9·8	12·24	11·61
Nursery	Hawaii ..	H. 1801 ..	21 months	11–8–26	18.8	17·97	·33	95·6	9·0	15·45	14·91
Nursery	Hawaii ..	H. 456 ..	21 months	11–8–26	20·1	19·27	·32	95·8	10·5	16·28	15·73
Nursery	Hawaii ..	H. 5803 ..	21 months	11–8–26	19·2	17·60	·50	91·6	10·0	14·96	14·09
Nursery	Java ..	P.O.J. 100 ..	21 months	11–8–26	20·0	18·95	·40	94·7	10·5	16·01	15·37
Nursery	Java ..	P.O.J. 213 ..	21 months	11–8–26	18·5	17·71	·84	95·7	13·6	14·41	13·91
Nursery	Java ..	P.O.J. 2714	21 months	11–8–26	19·8	18·81	·33	95·0	12·5	15·51	14·90
Nursery	Java ..	D.I. 52 ..	21 months	11–8–26	18·0	16·33	·37	90·7	9·8	13·91	13 07
Nursery	Hawaii ..	Striped Tip ..	21 months	11–8–26	20·3	19·07	·28	93·9	13·4	15·56	14·80
Nursery	Philippine ..	Luzon 2 ..	21 months	11–8–26	20·1	18.92	·17	94·1	9·8	16·12	15·42
Nursery	Philippine ..	Luzon 4 ..	21 months	11–8–26	20·9	19·79	·32	94·6	12·1	16·40	15·73

8. Southern Sugar Experiment Station—*continued.*

Brief Descriptions of New Canes.

Luzon 4.—Medium thick cream-yellow to green cane with rose blush; eyes narrow, full and pointed, resting in slight groove; straight stick, erect habit; internodes 2 to 5 inches; foliage broad and fairly plentiful; trash falls freely. It has somewhat shallow but strong root system; brittle cane.

Yellow Caledonia.—Stout brownish-green cane, with slight black wax and white rings round top of internode; eyes medium round, and full; internodes 2 to 4 inches long; straight stick, and erect habit; foliage broad and plentiful; trash falls freely; poor striker, with shallow, weak root system; brittle cane.

New Experiments Initiated.

Cultivation Experiment—

Plot 1—Six ploughings in all, one harrowing, one rolling.
Plot 2—Five ploughings in all, one harrowing, one rolling.
Plot 3—Four ploughings in all, one harrowing, one rolling.
Plot 4—Four ploughings in all, one subsoiling to 18 inches, one harrowing, and one rolling.
Plot 5—Four ploughings in all, two harrowings, one rolling.
Plot 6—Four ploughings in all, three harrowings, one rolling.

Second Series.

Duplicate of above.

Potash Experiment—

First Series.

Plot 1—300 lb. sulphate of potash per acre.
Plot 2—300 lb. muriate of potash per acre.
Plot 3—500 lb. sulphate of potash per acre.
Plot 4—500 lb. muriate of potash per acre.
Plot 5—No manure.

Second Series.

Plot 1—300 lb. sulphate of potash per acre.
Plot 2—300 lb. muriate of potash per acre.
Plot 3—500 lb. sulphate of potash per acre.
Plot 4—500 lb. muriate of potash per acre.
Plot 5—No manure.

New Varieties Introduced.

From Java—

E.K. Madoe.
E.K. 28 (second introduction).
D.I. 52 (second introduction).

The Bureau is indebted to Mr. C. Bezoet de Bie, of Java, for the above canes.

Distribution of Plants.

Owing to the presence of gum in this district, and in a few of the varieties on the Station, no distribution of plants was made this year. The extent to which this free distribution of canes is valued by the farmers in this and the districts supplied from this Station, was manifested in the disappointment expressed by applicants for varieties, but at the same time all appreciate the necessity for this action.

Annual Field Day.

The Annual Field Day of the Sugar Experiment Station at Bundaberg was held on Saturday, 29th May. The attendance of farmers, mill representatives, and commercial men was large, and keen interest was displayed in the proceedings. The visitors were shown over the various experiments, and after luncheon an extremely interesting address was delivered by Mr. J. K. Murray, Principal of the Agricultural High School and College at Gatton, on "Tractor Costs." This was greatly appreciated. Interesting addresses were delivered on the subject of cane pests and diseases by Mr. R. W. Mungomery and Mr. N. L. Kelly, members of the staff of the Sugar Bureau. Later in the afternoon a demonstration of farming implements and tractors was given. The Bureau is indebted to Messrs. Wyper Brothers, W. Marles, F. A. Brand, and W. Douglas and Sons for arranging the machinery demonstrations.

Arrowing of Canes.

No arrowing took place upon the Bundaberg Station this season.

Total Tonnage of Cane Harvested from the Southern Sugar Experiment Station, Bundaberg, during 1926.

	Tons.
Cane sent to mill	229·95
Nature of Crop—	
Plant cane	47·18
First ratoon	105·77
First ratoon (standover)	68·26
Second ratoon	8·74
Tonnages—	Per Cent.
Plant Q. 813	19·70
Plant D. 1135	0·81
First ratoon, D. 1135 (standover)	16·11
First ratoon, varieties (standover)	13·57
First ratoon, D. 1135	19·52
First ratoon, 1900 Seedling	7·55
First ratoon, varieties	18·94
Second ratoon, Q. 813	3·80
Acres harvested	17·5
Average tons of cane per acre	13·14

9. WORK OF THE LABORATORIES.

The chemical work comprised in the tables represents only a portion of that carried out by the Sugar Experiment Stations. A large number of soils, fertilisers, waters, &c., are analysed for growers as well as numerous sugar-cane varieties. Laboratories are attached to the various Sugar Experiment Stations, but apart from these most of the soil analyses are carried out at Brisbane, in the Agricultural Laboratory in charge of Mr. J. C. Brunnich, to whom the thanks of the Bureau are due for prompt rendering of results. Mr. C. R. Von Steiglitz, Analyst to the Bureau, carries out much work for the Experiment Stations in a thoroughly capable manner, and is at present engaged on research work of a most interesting character in connection with cane.

9. Work of the Laboratories—*continued.*

The tables set out below comprise the analytical work done by the Bureau :—

DETAILED REPORT OF ANALYTICAL WORK PERFORMED BY THE LABORATORY OF THE SOUTHERN SUGAR EXPERIMENT STATION, BUNDABERG, FOR THE SEASON 1925-1926.

Materials.	Number of Analyses.
Sugar canes and juices for growers	300
Sugar canes and juices for Agricultural Show, Bundaberg	78
Sugar canes and juices for Agricultural Show, Gin Gin	217
Sugar canes and juices for Agricultural Show, Maryborough	35
Sugar canes and juices for Experiment Station	91
Cane fibres for Experiment Station	7
Total	728

DETAILED REPORT OF ANALYTICAL WORK PERFORMED AT THE LABORATORY OF THE SUGAR EXPERIMENT STATION, SOUTH JOHNSTONE, FOR THE SEASON 1925-1926.

Materials.	Number of Analyses.
Sugar canes for station	649
Cane fibres	11
Furnace ash	1
Press cake	1
Megass ash	2
Soil for farmers (complete)	1
Lime for farmers	1
Total	666

DETAILED REPORT OF ANALYTICAL WORK PERFORMED BY THE LABORATORY OF THE SUGAR EXPERIMENT STATION, MACKAY, FOR THE SEASON 1925-1926.

Materials.	Number of Analyses.
Sugar canes and juices for growers	260
Sugar canes for Mackay Show	82
Sugar cane juices for Station	156
Sugar cane fibres	25
Fertilisers	5
Waters	5
Total	533

ANALYSES CARRIED OUT FOR THE BUREAU OF SUGAR EXPERIMENT STATIONS BY THE AGRICULTURAL LABORATORY FROM 1ST NOVEMBER, 1925, TO 31ST OCTOBER, 1926.

Materials.	Number of Analyses.
Soils	91
Subsoil	1
Soil acidity	1
Waters	3
Fertilisers	2
Stock feeds	2
Total	100

10. IRRIGATION AND OTHER EXPERIMENTS ON THE HOME HILL STATE FARM, INKERMAN DISTRICT, LOWER BURDEKIN.

By arrangement with the Department of Agriculture, some experiments with irrigation and fertilisers have been carried out for some years at the Home Hill State Farm, under the management of Mr. C. G. Munro. The following are the results for the present season, of different methods of irrigation :—

Plots.	Tons per acre.	Cost per ton.	Realization per ton	Return per ton.
		£ s. d.	£ s. d.	s. d.
A ..	38.58	1 17 6	2 6 11	9 5
B ..	37.14	1 13 6	2 5 1	11 7
C ..	34.18	1 16 7	2 5 7	9 0
D ..	29.88	1 16 8	2 8 0	11 4

Costs include wages, cultivation, fertilising, stabling, irrigating, cost of manure, plants, also of water supplied and mill levies, but not interest on capital invested nor depreciation on assets.

The following notes have been kindly supplied by Mr. Munro :—

"The history and data of the Plant Badila Experiments conducted during 1925 to 1926 on this farm are as follows :—Four plots were laid out on a piece of land of uniform quality and of average district fertility, originally timbered with bloodwood and poplar gum. Each plot contained three-fourths of an acre. Plot A was fertilised with B_3 mixture at the rate of 6 cwt. per acre, but Plot B of the same area was unfertilised. Both A and B were irrigated according to the Hawaiian system of irrigation, but the rows of cane were laid out 6½ chains long to try out the effects of watering in longer rows than the short 30 feet rows of the first series of experiments. Plots C and D of the same area and shape adjoined A and B, but were cultivated and watered in the ordinary manner peculiar to the district. Plot C, however, was also fertilised with B_3 mixture at the rate of 6 cwt. per acre, and Plot D not fertilised.

"Planting on all the plots was completed on the 3rd August, 1925, and the harvesting completed on 27th October, 1926. Cultivation and cleaning on the Hawaiian irrigated plots were carried out with horse-drawn implements to cut out the heavy expense of hand work usually associated with the Hawaiian system, and although the height of the soil banks between the rows was reduced by necessary cultivation yet the banks were sufficiently high at all times to confine the irrigation water from over-flowing their tops."

The fertiliser experiment of which the plant crop results were furnished last year, was so interfered with by the length of time taken to cut same during the industrial troubles of last year at Bowen as to render the plots of the ratoon crop not comparable.

11. SEEDLING PROPAGATION AT THE SOUTH JOHNSTONE SUGAR EXPERIMENT STATION.

The raising of seedling canes was commenced at the Sugar Experiment Station in 1921.

The following are particulars of the number of seedlings raised each year, from 1921 to 1926:—

Year.	Number.
1921	736
1922	246
1923	344
1924	3,005
1925	460
1926	3,000
	7,791

Seedlings transplanted to nursery—first stage:—

Year.	Number.
1921	390
1922	55
1923	123
1924	656
1925	460
	1,684

SEEDLING WORK, 1926.

This year tassels were more abundant than usual, the majority of varieties arrowing. Early tassels showed much more pollen than in previous years, the weather conditions apparently having a favourable influence on the anthers.

Although a good number of seedlings were raised from the superior canes (selfed seedlings), the work this year was confined chiefly to crossing, using the Hawaiian method of inserting the tassels in sulphurous acid solution. Very little success was obtained, only one seedling being raised from Uba, and six seedlings from S.J.Q. 28. Such a small germination could be classed of doubtful origin. The crossing was mainly confined to the Uba cane as female parent.

Dusting by hand was also carried out, but only seventeen seedlings were raised, no germinations being obtained from Uba. The dusting was carried out between the hours of 9 and 10 a.m. and 3 and 4 p.m. Two to three tassels were used for each dusting.

It may be mentioned that the weather turned very cold over the period of germination in the seedling flats.

The following are the number of seedlings raised, with parentage:—

	Seedlings.
S.J.Q. 312	1,590
S.J.Q. 49	425
S.J.Q. 46	275
S.J.Q. 41	182
S.J.Q. 3	148
S.J.Q. 319	110
S.J.Q. 51	78
S.J.Q. 1	25
S.J.Q. 55	4
S.J.Q. 17	2
Q. 903	19
E.K. 28	64

The following crosses were obtained:—

	Seedlings.
S.J.Q. 102 x S.J.Q. 1	14
S.J.Q. 28 x S.J.Q. 3	6
N.G. 16 x S.J.Q. 1	3
Uba x N.G. 15	1

Approximately 3,000 seedlings were raised in the germinating flats. The variety Malabar arrowed freely; the flowers, however, failed to open.

From the above number of seedlings raised approximately 400 have been transplanted into the larger boxes. Another 200 will be transplanted during the present month. From this lot the most promising will be selected and transplanted to the field nursery during the month of November.

Progress Report.

From the 1921 and 1922 raisings, the following 43 S.J.Q. canes have been planted out during the month of August to undergo a competitive testing out for commercial value, viz.:—Nos. 4, 53, 3, 2, 7, 5, 9, 12, 15, 16, 19, 17, 25, 21, 28, 26, 41, 31, 45, 44, 48, 46, 51, 49, 55, 54, 60, 58, 20, 64, 77, 70, 112, 91, 174, 137, 312, 301, 319, 318, 344, 329, 468.

1923 Seedlings.—The raisings of this year have been brought down to three canes, viz., Nos. 356, 361, and 475. These canes were again planted out during the month of August.

1924 Seedlings.—A selection was again made during the month of August from the plant and first ratoon crops. Only thirty-one canes were selected as showing any promise. These have been planted for further drafting out.

1925 Seedlings.—From this lot twenty-one canes were selected and planted out to second stage.

12. VARIETIES OF CANE GROWN BY THE SUGAR EXPERIMENT STATIONS SINCE 1893.

Serial Number	Variety.	Country.	Year Introduced.	Final Result.
1	Mavoe or Mahoaovu	New Guinea	1893	Discarded
2	Chenoma	,,	,,	,,
3	Iduari	,,	,,	,,
4	Arabora	,,	,,	Died out
5	Batoe	,,	,,	Discarded
6	Kikarea	,,	,,	,,
7	Oiva	,,	,,	,,
8	Nave or Mave	,,	,,	,,
9	Moo Moo Oiboku	,,	,,	,,
10	Mabuan	,,	,,	,,
11	Akewa	,,	,,	,,

12. Varieties of Cane—*continued.*

VARIETIES OF CANE GROWN BY THE SUGAR EXPERIMENT STATIONS SINCE 1893—*continued.*

Serial Number.	Variety.	Country.	Year Introduced.	Final Result.
12	Oraya	New Guinea	1893	Discarded
13	New Guinea 1	,,	1896	,,
14	,, 2	,,	,,	,,
15	,, 3	,,	,,	,,
16	,, 4	,,	,,	,,
17	,, 4A	,,	,,	,,
18	,, 5	,,	,,	,,
19	,, 6A	,,	,,	,,
20	,, 6B	,,	,,	,,
21	,, 7	,,	,,	,,
22	,, 8A	,,	,,	,,
23	,, 9	,,	,,	,,
24	,, 10	,,	,,	,,
25	,, 11	,,	,,	,,
26	,, 12	,,	,,	,,
27	,, 13	,,	,,	,,
28	,, 14	,,	,,	,,
29	,, 15 (Badila)	,,	,,	Retained
30	,, 16	,,	,,	,,
31	,, 17	,,	,,	Discarded
32	,, 18	,,	,,	,,
33	,, 19	,,	,,	,,
34	,, 20	,,	,,	,,
35	,, 21	,,	,,	,,
36	,, 22 (Mahona)	,,	,,	,,
37	,, 23	,,	,,	,,
38	,, 24 (Goru)	,,	,,	Retained
39	,, 24A (Striped Goru)	,,	,,	,,
40	,, 24B (Green Goru)	,,	,,	,,
41	,, 25	,,	,,	Discarded
42	,, 26	,,	,,	,,
43	,, 27	,,	,,	,,
44	,, 28	,,	,,	,,
45	,, 29	,,	,,	,,
46	,, 30	,,	,,	,,
47	,, 31	,,	,,	,,
48	,, 32	,,	,,	,,
49	,, 33	,,	,,	,,
50	,, 34	,,	,,	,,
51	,, 35	,,	,,	,,
52	,, 36	,,	,,	,,
53	,, 37	,,	,,	,,
54	,, 38	,,	,,	,,
55	,, 39	,,	,,	,,
56	,, 40	,,	,,	,,
57	,, 41	,,	,,	,,
58	,, 42	,,	,,	,,
59	,, 43	,,	,,	,,
60	,, 44	,,	,,	,,
61	,, 45	,,	,,	,,
62	,, 46	,,	,,	,,
63	,, 47	,,	,,	,,
64	,, 48	,,	,,	,,
65	,, 49 (Green Baruma)	,,	,,	,,
66	,, 49 (Red Baruma)	,,	,,	,,
67	,, 50	,,	,,	,,
68	,, 51	,,	,,	,,
69	,, 52	,,	,,	,,
70	,, 53	,,	,,	,,
71	,, 54	,,	,,	,,
72	,, 55	,,	,,	,,
73	,, 56	,,	,,	,,
74	,, 57	,,	,,	,,
75	,, 58	,,	,,	,,
76	,, 59	,,	,,	,,
77	,, 60	,,	,,	,,
78	,, 61	,,	,,	,,
79	,, 62	,,	,,	,,
80	,, 63	,,	,,	,,
81	,, 64	,,	,,	,,
82	,, 65	,,	,,	,,
83	,, 66	,,	,,	,,
84	Yuban or Uba	South Africa	1901	Retained
85	Meera	,,	1898	Discarded
86	White Bamboo	,,	,,	,,
87	Striped Singapore	,,	,,	Retained
88	Rose Bamboo or Rappoe	,,	,,	,,
89	Bourbon	Mauritius	,,	Died out
90	Louisiana Striped	Louisiana	1902	Discarded
91	Louisiana Tiboo Merd	,,	,,	,,
92	Demerara 74	,,	,,	,,
93	,, 95	,,	,,	,,
94	Trinidad Seedling 60	Trinidad	,,	,,
95	,, 83	,,	,,	,,
96	,, 202	,,	,,	,,

12. Varieties of Cane—*continued.*

VARIETIES OF CANE GROWN BY THE SUGAR EXPERIMENT STATIONS SINCE 1893—*continued.*

Serial Number.	Variety.	Country.	Year Introduced.	Final Result.
97	Trinidad Seedling 205	Trinidad	1902	Discarded
98	Mauritius Borneo	Mauritius	1903	,,
99	,, Galogo C.	,,	,,	,,
100	,, Bambou Rouge	,,	,,	,,
101	,, Louzier Rouge	,,	,,	,,
102	,, Tamarin	,,	,,	,,
103	,, Settlers	,,	,,	,,
104	Barbadoes 208	Barbadoes	,,	,,
105	S.A. 1	South Africa	1905	,,
106	,, 2	,,	,,	,,
107	Hambledon, Queensland 5	Queensland	1906	,,
108	,, 10	,,	,,	,,
109	,, 11	,,	,,	,,
110	,, 62	,,	,,	,,
111	,, 114	,,	,,	,,
112	,, 172	,,	,,	,,
113	,, 222	,,	,,	,,
114	,, 243	,,	,,	,,
115	,, 285	,,	,,	Retained
116	,, 297	,,	,,	Discarded
117	White Mexican	Hawaii	,,	Died out
118	Queensland 6	Queensland	1908	Discarded
119	,, 30	,,	,,	,,
120	,, 102	,,	,,	,,
121	,, 116	,,	,,	,,
122	,, 121	,,	,,	,,
123	,, 176	,,	,,	,,
124	Barbadoes 147	Barbadoes	,,	,,
125	Mauritius Malagache	Mauritius	,,	,,
126	,, 1900 Seedling	,,	1909	Retained
127	Hambledon, Queensland 426	Queensland	,,	,,
128	,, 458	,,	,,	,,
129	Mauritius 189	Mauritius	,,	Discarded
130	,, Couve	,,	,,	,,
131	,, 55	,,	,,	,,
132	,, 87	,,	,,	,,
133	,, 89	,,	,,	,,
134	,, 779	,,	,,	,,
135	,, 998	,,	,,	,,
136	,, 1022	,,	,,	,,
137	,, 1201	,,	,,	Died out
138	,, 1237	,,	,,	,,
139	,, 1474	,,	,,	Discarded
140	Louisiana Striped	Louisiana	1910	,,
141	,, Purple	,,	,,	,,
142	Demerara 117	Demerara	,,	Died out
143	,, 604	,,	,,	,,
144	Trinidad 211	Trinidad	,,	Discarded
145	Queensland 8	Queensland	,,	Died out
146	,, 25	,,	,,	,,
147	,, 30	,,	,,	,,
148	,, 45	,,	,,	,,
149	,, 58	,,	,,	Discarded
150	,, 59	,,	,,	,,
151	,, 64	,,	,,	Died out
152	,, 65	,,	,,	,,
153	,, 80	,,	,,	,,
154	,, 102	,,	,,	Discarded
155	,, 103	,,	,,	Died out
156	,, 112	,,	,,	,,
157	,, 115	,,	,,	,,
158	,, 116	,,	,,	Discarded
159	,, 121	,,	,,	,,
160	,, 126	,,	,,	Died out
161	,, 135	,,	,,	Discarded
162	,, 137	,,	,,	,,
163	,, 153	,,	,,	Died out
164	,, 162	,,	,,	,,
165	,, 285	,,	,,	,,
166	,, 286	,,	,,	Discarded
167	,, 303	,,	,,	,,
168	,, 307	,,	,,	,,
169	,, 328	,,	,,	,,
170	,, 363	,,	,,	Died out
171	,, 365	,,	,,	Discarded
172	,, 422	,,	,,	Died out
173	,, 430	,,	,,	,,
174	,, 437	,,	,,	Discarded
175	,, 452	,,	,,	,,
176	,, 554	,,	,,	,,
177	,, 558	,,	,,	,,
178	,, 682	,,	,,	Died out
179	,, 684	,,	,,	Discarded
180	,, 694	,,	,,	,,
181	,, 695	,,	,,	,,
182	,, 698	,,	,,	,,
183	,, 704	,,	,,	Died out

12. Varieties of Cane—*continued.*

VARIETIES OF CANE GROWN BY THE SUGAR EXPERIMENT STATIONS SINCE 1893—*continued.*

Serial Number.	Variety.	Country.	Year Introduced.	Final Result.
184	Queensland 717	Queensland	1910	Died out
185	,, 719	,,	,,	Discarded
186	,, 721	,,	,,	,,
187	,, 745	,,	,,	,,
188	,, 747	,,	,,	,,
189	,, 748	,,	,,	,,
190	,, 750	,,	,,	,,
191	,, 763	,,	,,	,,
192	,, 764	,,	,,	Died out
193	,, 767	,,	,,	Discarded
194	,, 768	,,	,,	,,
195	,, 777	,,	,,	Died out
196	,, 779	,,	,,	Discarded
197	,, 787	,,	,,	Died out
198	,, 792	,,	,,	Discarded
199	,, 793	,,	,,	Died out
200	,, 794	,,	,,	,,
201	,, 795	,,	,,	Discarded
202	,, 803	,,	,,	Died out
203	,, 811	,,	,,	Discarded
204	,, 812A	,,	,,	,,
205	,, 813	,,	,,	Retained
206	,, 815	,,	,,	Discarded
207	,, 820	,,	,,	,,
208	,, 822	,,	,,	,,
209	,, 830	,,	,,	Died out
210	,, 840	,,	,,	Discarded
211	,, 849	,,	,,	,,
212	,, 854	,,	,,	Died out
213	,, 855	,,	,,	Retained
214	,, 865	,,	,,	Died out
215	,, 866	,,	,,	,,
216	,, 881	,,	,,	Discarded
217	,, 884	,,	,,	,,
218	,, 886	,,	,,	Died out
219	,, 887	,,	,,	Discarded
220	,, 889	,,	,,	,,
221	,, 891	,,	,,	,,
222	,, 899	,,	,,	,,
223	,, 900	,,	,,	,,
224	,, 903	,,	,,	Retained
225	,, 918	,,	,,	Discarded
226	,, 928	,,	,,	,,
227	,, 962	,,	,,	,,
228	,, 970	,,	,,	,,
229	,, 976	,,	,,	Died out
230	,, 977	,,	,,	Discarded
231	,, 979	,,	,,	,,
232	,, 992	,,	,,	,,
233	,, 995	,,	,,	,,
234	,, 997	,,	,,	,,
235	,, 999	,,	,,	,,
236	,, 1001	,,	,,	,,
237	,, 1004	,,	,,	,,
238	,, 1009	,,	,,	,,
239	,, 1013	,,	,,	,,
240	,, 1019	,,	,,	,,
241	,, 1023	,,	,,	,,
242	,, 1025	,,	,,	,,
243	,, 1035	,,	,,	,,
244	,, 1046	,,	,,	,,
245	,, 1048	,,	,,	,,
246	,, 1049	,,	,,	,,
247	,, 1052	,,	,,	,,
248	,, 1070	,,	,,	Died out
249	,, 1071	,,	,,	Discarded
250	,, 1074	,,	,,	,,
251	,, 1078	,,	,,	,,
252	,, 1079	,,	,,	,,
253	,, 1084	,,	,,	,,
254	,, 1086	,,	,,	,,
255	,, 1092	,,	,,	Retained
256	,, 1095	,,	,,	Discarded
257	,, 1098	,,	,,	Retained
258	,, 1102	,,	,,	Discarded
259	,, 1103	,,	,,	,,
260	,, 1108	,,	,,	,,
261	,, 1110	,,	,,	,,
262	,, 1112	,,	,,	,,
263	,, 1113	,,	,,	,,
264	,, 1115	,,	,,	,,
265	,, 1121	,,	,,	,,
266	,, 1133	,,	,,	,,
267	Barbadoes 176	Barbadoes	,,	,,
268	,, 224	,,	,,	,,
269	,, 1529	,,	,,	,,

12. Varieties of Cane—*continued.*

VARIETIES OF CANE GROWN BY THE SUGAR EXPERIMENT STATIONS SINCE 1893—*continued*

Serial Number.	Variety.	Country.	Year Introduced.	Final Result.
270	Barbadoes 3412	Barbadoes	1910	Discarded
271	,, 3747	,,	,,	,,
272	,, 3922	,,	,,	,,
273	,, 6450	,,	,,	Died out
274	Demerara 115	Demerara	,,	Discarded
275	,, 145	,,	,,	,,
276	,, 306	,,	,,	,,
277	,, 1135	,,	,,	Retained
278	,, 1483	,,	,,	Discarded
279	Badila Seedling	Queensland	,,	Retained
280	Hybrid No. 1	,,	,,	Discarded
281	Cassilis	,,	,,	,,
282	Malabar	Mauritius	,,	Retained
283	Otamite	,,	,,	Discarded
284	Cheribon	,,	,,	Retained
285	Gingila	Queensland	,,	Discarded
286	Petite Senneville	Mauritius	1912	,,
287	N.G. 67	New Guinea	,,	,,
288	,, 68	,,	,,	,,
289	,, 69	,,	,,	,,
290	,, 70	,,	,,	,,
291	,, 71	,,	,,	,,
292	,, 72	,,	,,	,,
293	,, 73	,,	,,	,,
294	,, 74	,,	,,	,,
295	,, 75	,,	,,	,,
296	,, 76	,,	,,	,,
297	,, 77	,,	,,	,,
298	,, 78	,,	,,	,,
299	,, 79	,,	,,	,,
300	,, 80	,,	,,	,,
301	,, 81	,,	,,	,,
302	,, 82	,,	,,	,,
303	,, 83	,,	,,	,,
304	,, 84	,,	,,	,,
305	,, 85	,,	,,	,,
306	,, 86	,,	,,	,,
307	,, 87	,,	,,	,,
308	,, 88	,,	,,	,,
309	,, 89	,,	,,	,,
310	,, 90	,,	,,	,,
311	,, 91	,,	,,	,,
312	,, 92	,,	,,	,,
313	,, 93	,,	,,	,,
314	,, 94	,,	,,	,,
315	,, 95	,,	,,	,,
316	,, 96	,,	,,	,,
317	,, 97	,,	,,	,,
318	,, 98	,,	,,	,,
319	,, 99	,,	,,	,,
320	,, 100	,,	,,	,,
321	,, 101	,,	,,	,,
322	,, 102	,,	,,	,,
323	,, 103	,,	,,	,,
324	,, 104	,,	,,	,,
325	,, 105	,,	,,	,,
326	,, 106	,,	,,	,,
327	,, 107	,,	,,	,,
328	,, 108	,,	,,	,,
329	,, 109	,,	,,	,,
330	,, 110	,,	,,	,,
331	,, 111	,,	,,	,,
332	,, 112	,,	,,	,,
333	,, 113	,,	,,	,,
334	,, 114	,,	,,	,,
335	,, 115	,,	,,	,,
336	,, 116	,,	,,	,,
337	,, 117	,,	,,	,,
338	,, 118	,,	,,	,,
339	,, 119	,,	,,	,,
340	,, 120	,,	,,	,,
341	,, 121	,,	,,	,,
342	,, 122	,,	,,	,,
343	,, 123	,,	,,	,,
344	,, 124	,,	,,	,,
345	,, 125	,,	,,	,,
346	,, 126	,,	,,	,,
347	,, 127	,,	,,	,,
348	,, 128	,,	,,	,,
349	,, 129	,,	,,	,,
350	,, 130	,,	,,	,,
351	,, 131	,,	,,	,,
352	,, 132	,,	,,	,,
353	,, 133	,,	,,	,,
354	,, 134	,,	,,	,,
355	,, 135	,,	,,	,,

12. Varieties of Cane—*continued.*

VARIETIES OF CANE GROWN BY THE SUGAR EXPERIMENT STATIONS SINCE 1893—*continued.*

Serial Number.	Variety.	Country.	Year Introduced.	Final Result.
356	N.G. 136	New Guinea	1912	Discarded
357	„ 137	„	„	„
358	„ 138	„	„	„
359	„ 139	„	„	„
360	„ 140	„	„	„
361	„ 141	„	„	„
362	„ 142	„	„	„
363	„ 143	„	„	„
364	„ 144	„	„	„
365	„ 145	„	„	„
366	„ 146	„	„	„
367	„ 147	„	„	„
368	„ 148	„	„	„
369	„ 149	„	„	„
370	„ 150	„	„	„
371	„ 151	„	„	„
372	„ 152	„	„	„
373	„ 153	„	„	„
374	„ 154	„	„	„
375	„ 155	„	„	„
376	„ 156	„	„	„
377	„ 157	„	„	„
378	„ 158	„	„	„
379	„ 159	„	„	„
380	„ 160	„	„	„
381	„ 161	„	„	„
382	„ 162	„	„	„
383	„ 163	„	„	„
384	„ 164	„	„	„
385	„ 165	„	„	„
386	„ 166	„	„	„
387	„ 167	„	„	„
388	„ 168	„	„	„
389	„ 169	„	„	„
390	„ 170	„	„	„
391	„ 171	„	„	„
392	„ 172	„	„	„
393	„ 173	„	„	„
394	„ 174	„	„	„
395	„ 175	„	„	„
396	„ 176	„	„	„
397	„ 177	„	„	„
398	„ 178	„	„	„
399	„ 179	„	„	„
400	„ 180	„	„	„
401	„ 181	„	„	„
402	„ 182	„	„	„
403	„ 183	„	„	„
404	„ 184	„	„	„
405	„ 185	„	„	„
406	Gingraya	Queensland	1914	„
407	Gingor	„	„	„
408	Shahjahanpur No. 10	India	1915	„
409	M. 15^{04}	Mauritius	1916	„
410	M. 29^{04}	„	„	„
411	M. 168^{04}	„	„	„
412	M. 222^{04}	„	„	„
413	J. E.K.[1]	Java	„	Retained
414	J. E.K.[2]	„	„	„
415	J. E.K.[28]	„	„	„
416	J. 100 Bont	„	„	Discarded
417	J. 247 Generatie	„	„	„
418	8 R. 431	Fiji	„	„
419	7 R. 428	„	„	Retained
420	Mossman, Queensland, No. 1	Queensland	„	Discarded
421	H. 109	Hawaii	1917	„
422	H. 146	„	„	Retained
423	H. 227	„	„	„
424	H.Q. 77	Queensland	„	Discarded
425	B. 4030	Barbadoes	„	„
426	B. 6450	„	„	„
427	B. 254	„	„	Died out
428	B. 4596	„	„	Discarded
429	B. 6204	„	„	Died out
430	B. 4934	„	„	„
431	D. 109	Demerara	„	Retained
432	Oba Badila	New Guinea	1918	„
433	7 R. 96	Fiji	„	Destroyed by flood waters
434	Mossman, Queensland, No. 2	Queensland	„	Discarded
435	Mauritius 32^{10}	Mauritius	1919	„
436	„ 28^{10}	„	„	„
437	„ 131^{168}	„	„	„
438	„ 55^{1182}	„	„	Retained
439	„ 55^{11}	„	„	Discarded
440	Mossman, Queensland, No. 3	Queensland	1921	„
441	„ „ No. 4	„	„	„

12. Varieties of Cane—*continued.*

VARIETIES OF CANE GROWN BY THE SUGAR EXPERIMENT STATIONS SINCE 1893—*continued.*

Serial Number.	Variety.	Country.	Year Introduced.	Final Result.
442	Mossman, Queensland, No. 5	Queensland	1921	Discarded
443	,, No. 6	,,	,,	,,
444	,, No. 7	,,	,,	,,
445	Barbadoes 156	Barbadoes	,,	Retained
446	Mauritius 64/14	Mauritius	,,	,,
447	,, 55/453	,,	,,	,,
448	,, 291/08	,,	,,	,,
449	,, 33/95	,,	,,	,,
450	,, 131/126	,,	,,	,,
451	,, R.P. 6	,,	,,	,,
452	,, R.P. 8	,,	,,	,,
453	,, R.P. 73	,,	,,	Discarded
454	Java, S.W. 3	Java	1922	,,
455	,, D.I. 52	,,	,,	Retained
456	,, 90 F.	,,	,,	,,
457	,, P.O.J. 36	,,	,,	Discarded
458	,, P.O.J. 100	,,	,,	Retained
459	,, P.O.J. 213	,,	,,	,,
460	,, P.O.J. 2714	,,	,,	,,
461	Hawaii, 456	Hawaii	,,	,,
462	,, 458	,,	,,	,,
463	,, 427	,,	,,	Discarded
464	,, 1801	,,	,,	,,
465	,, 5803	,,	,,	Retained
466	,, Striped Tip	,,	,,	,,
467	Philippine Is., Luzon 2	Philippine Is.	,,	,,
468	,, Luzon 3	,,	,,	Discarded
469	,, Luzon 4	,,	,,	Retained
470	,, H. 27	,,	,,	Discarded
471	India, Sahranpur Black	India	1923	Died out
472	,, Co. 210	,,	,,	Under examination
473	,, Co. 213	,,	,,	,,
474	,, Co. 227	,,	,,	,,
475	,, Co. 239	,,	,,	,,
476	,, Assam Red Seedling	,,	,,	,,
477	Java, E. K. Madoe	Java	1925	,,

The above list does not contain any of the seedlings raised at South Johnstone, as these are still in the experimental stage. Where canes are marked "discarded" they have been discarded at all three stations. Where marked "retained" they may be retained only at one or more stations.

13. ABSTRACTS FROM REPORTS OF SUGAR RESEARCH SCHOLARS NOW ABROAD.

The three research students now abroad are Messrs. N. Bennett, A. F. Bell, and H. W. Kerr. These gentlemen were graduates of the Queensland University, and were appointed to travelling scholarships. In addition to studying at academic institutions the scholars have paid visits to other sugar-producing countries of the world, and extracts from their reports are very interesting reading for sugar-growers.

LOUISIANA.

The following abstract has been made of Mr. N. Bennett's report, who is the Sugar Technology Scholar, which was made early in 1926:—

Sugar-cane was first introduced into Louisiana in 1751. The canes were brought from the Island of Hispaniola by the Jesuits, who grew cane in a small way for the production of syrup.

Until 1795, no success was attained in the manufacture of the crystal product itself, the reason probably being due to the poor variety of cane and to the low quality of the juices.

Before the production of sugar from the tropical countries proper and before the abolition of slavery, the Louisiana industry was one of prosperity. At the present time, it is no exaggeration to assert that a very grave crisis in the sugar-cane industry is now at hand in Louisiana.

Despite the protective tariff of 2·206 cents per lb. on all foreign sugar entering the United States of America, and the preferential tariff of 1·765 cents per lb. placed on Cuban sugars of 96 degrees polarisation, the Louisiana industry is finding it extremely difficult and in many cases utterly impossible to produce sugar at a price which is profitable.

This point is particularly applicable to the season just nearing completion.

The sugar belt of Louisiana is situated at the south and the south-western part of the State, along the banks of the Mississippi River, between Baton Rouge and New Orleans. Comparatively few of the factories are situated to the east of the river; to the west the sugar section extends some 80 or 90 miles.

The geographical situation of the sugar belt is not well suited for cane, which prefers a tropical climate. New Orleans is at about the same latitude north as Brisbane is south, and yet all the cane produced in Louisiana is grown north of New Orleans.

This means that the canes are subjected to severe frosts during the winter months—in fact, records of temperature this year show the low figure of 22 degrees F.—10 degrees of frost.

Harvesting begins about the middle of October and continues until the beginning of January. This means a total grinding season of three months at most—a grinding season which can be easily affected by heavy rainfall or severe frost.

13. Reports of Sugar Research Scholars—*continued.*

The number of factories in actual operation is on the decrease, and of those still operating the majority are under the control of banking institutions.

The large number of factories operating on such a small tonnage of cane has a decided influence on the total cost of production of every ton of sugar. A comparison with Queensland figures for some years past will show this point clearly—

Year.	Number of Factories.		Sugar in Tons.	
	Queensland.	Louisiana.	Queensland.	Louisiana.
1918 ..	36	132	189,978	280,900
1919 ..	36	121	162,136	121,000
1920 ..	36	122	167,401	169,127
1921 ..	36	124	282,198	324,431
1922 ..	36	112	287,785	295,095
1923 ..	36	105	269,175	162,023
1924 ..	36	109	409,136	..

The short length of the harvesting season in Louisiana calls for the installation of mill machinery capable of handling the whole tonnage in a short time. For this reason, the sizes of the crushing mills are all larger than is found in Queensland.

The operation of so many factories and the consequential keen competition for cane increases the difficulty of the situation.

Many of the plantations produce cane for their own factory—in most cases this is not sufficient to keep the mill going, and the deficit is made up by buying cane from neighbouring planters.

Except in two isolated instances, no cane is bought on a sucrose basis. As is usual with such a system, the miller has to accept an excessive amount of badly-topped cane of low sucrose content. In such a season as the one in 1925 this system is disastrous to the miller. The average yield of sugar per ton of cane was only 108·3 lb., which barely pays for the cane so purchased and allows nothing for transportation costs and manufacture.

Owing to the spells of cold and frosty weather during the winter months, all cane harvested has to be grown in a period of about nine months. Consequently, most of the cane milled has not sufficient time to reach maturity, and juice purities averaging above 80 are uncommon. The influence of the frosty weather closely following on a period of heavy growth further reduces the possibility of the cane reaching ripeness.

The chief varieties of cane cultivated are D. 74 and Louisiana Striped Purple. Attempts have been made to substitute better varieties, the Javan canes P.O.J. 36 and 234 being considered the most promising of these new canes.

One serious aspect of the use of these newer varieties is the enormously high price charged for seed cane. For seed cane of P.O.J. 234 as high as 130 dollars a ton has been paid. This throws the whole burden of trials upon the Experimental Station or upon a few of the more fortunate plantations.

Cane-cutting is done by negroes—both men and women—who are employed at a rate of 1 dollar 50 cents per day. Under normal conditions, the cost of cutting cane varies from 75 cents to 1 dollar per ton. Owing to the shortage of negro labour, much difficulty is experienced in cutting sufficient cane for the needs of the factory. In the event of wet weather, it usually necessitates a stop of from two to five days in factory operation. This lost time for cane supply averages about 30 per cent. of the total time.

Cane-loading in the fields is done by small portable derricks driven by a gasoline engine.

Different methods of transportation to the factory are in use—all, except that loaded on to mule wagons, being double and in some instances triple handled. The cane is loaded on to wagons and taken either to the factory or to the nearest derrick for loading into railway wagons. The carted cane is stored in a pile at the factory and later fed on to the carrier by a large crane and grab. Sometimes 3,000 to 4,000 tons of cane are stored around the carrier under this system.

All the haulage is accomplished by mule carts; in good weather only two mules are required to haul the cart carrying about 2 tons of cane. In bad weather, owing to the sodden nature of the roads, four mules are required to haul 1 ton.

It seems that the method of light portable tramlines has been tried but abandoned because of the high cost of upkeep and the boggy nature of the ground after heavy rains.

Based upon the small scale results obtained by the Experimental Station over a number of years in the cultivation of sugar beets, a small beet slicing factory has been ordered to deal with the beet produced from 100 acres of land planted with beets in various parts of the Louisiana sugar districts.

The sugar beet as grown at the Experimental Station gives a higher tonnage per acre (20 tons) with a slightly lower sucrose content (12 to 13 per cent.) than that obtained in the western districts of California and Colorado. The plots have given such promise that an appropriation of 25,000 dollars was made to provide machinery for practical size working. This new machinery is to be worked in connection with the present small factory at the University.

Seed was distributed to the planters in early December. Each planter was allotted an area of 5 acres, for which seed would be provided and advice given in the preparation of the land. All beets raised are to be treated at the small experimental factory.

Should the result of these tests meet with any success, the sugar industry of Louisiana may finally become totally beet sugar producing.

Manufacture.

The sugar made by the Louisiana factories can be divided into the following classes:—

(i.) Plantation granulated.
(ii.) Yellow clarified.
(iii.) Raws of 96 deg. Poln.
(iv.) Molasses sugars.

In addition to the manufacture of sugar, a number of factories are equipped to turn out a marketable grade of syrup.

In this connection it must be pointed out that the market for these syrups is much better in U.S.A. than is the case in Australia.

Consequently, when the market price of syrup

13. Reports of Sugar Research Scholars—*continued.*

is high, it is sometimes profitable to manufacture syrup only or to boil one strike of sugar and treat the resulting molasses with SO_2 in order to make an edible first molasses.

In 1924, when, owing to drought, the cane crop of Georgia was small, the price of this syrup reached such a height that some factories devoted their entire activities to syrup making.

Plantation Granulated.—This sugar is made either by the cold sulphitation process or with the aid of vegetable carbons. These latter include—

(*a*) Norit.

(*b*) Suchar.

(*c*) Carbrax.

Where white sugar is made with the sulphitation process, the article produced is not of first quality. It has to be sold as "off-colour granulated." In the case of the factories using vegetable carbons, most of the sugar produced is "Standard Granulated."

Yellow Clarified.—This class of sugar—of small soft yellowish white grain—is made almost exclusively with sulphur.

Raws.—In keeping with Cuban practice, this is the usual type of sugar produced. It is possible to centrifugal both first and second massecuites to give a 96 degree sugar without water. Enough water is used, however, to assist in "cutting" the fugals quickly.

Molasses Sugars.—As very few of the Louisiana houses have crystallisers, it is common practice to boil the second molasses to string proof (jelly) and to recover a molasses sugar from this so-called "magma" during the summer months.

Syrup Manufacture.—The manufacture of syrup is divided into two methods:—

1. Open kettle evaporation.
2. Sulphitation with subsequent vacuum evaporation.

Machinery.

The influence of the short crushing season and the poor quality of the cane treated has its effect on the machinery used in many of the houses.

The typical Louisiana house has very little modern machinery—in fact, many of the houses are lamentably deficient in the amount of machinery necessary to cope with the tonnages put through. This is, in part, due to financial consideration; in addition, the flat rate of cane purchase does not make it imperative for the factory to attain maximum efficiency either in the crushing department or in the evaporating department.

A table showing the actual distribution of various-sized plants is—

Two mills	10
Crusher + Two mills	21
Three mills	3
Crusher + Three mills	6
Crusher + Four mills	4
Double crusher (Searby shredder) + Three mills	1

This does not include the factories which have two distinct sets of mills.

From the above it can be seen that the usual arrangement is that of a crusher and two mills—in all cases the two mills being driven by one engine with duplicate gearing sets. This makes the peripheral speed of both mills the same, this peripheral speed being between 22 and 25 feet per minute. The size of the mill rollers is usually 34 inches by 72 inches, some few plants having 34 inch by 78 inch and 36 inch by 78 inch rolls.

Boiler Station.—In most instances the boiler station is equipped either to burn megass or oil. The boilers are seldom of the water tube type, and the megass furnace of the old Dutch oven type.

Owing to the fact that the Louisiana industry is situated near to a large oil-producing district, the use of oil in place of wood or coal is universal. Most of the boilers are equipped with furnaces so constructed that the megass furnace can be cut out and oil fuel used instead.

This fuel oil is sold in barrels of 43 U.S. gallons at a price which averages $1.50 (6s.) per barrel. This means a price of approximately 3½ cents per gallon.

The Celotex Company (insulating board) has some installations for baling megass in Louisiana. The contracts entered into between the Celotex Company and the sugar factories are made out so that the factories contract to sell the whole of the megass made during a period of years—in most cases ten years—to the Celotex Company. The Celotex Company erects its own baling plant and then transfers the baled megass to a central storage station.

The price paid for the megass is calculated on a basis of moisture-free megass. This price is 55 dollars per 100 tons of cane—the fibre of the cane being assumed to be 10 per cent. This base price operates when the price of fuel oil is $1.50 per barrel of 43 U.S. gallons, the price rising or falling as the price of the fuel oil varies. This price for fuel oil includes all costs landed at the factory price.

Under this arrangement, the oil consumption has to be under 14 gallons per ton of cane, if the sugar factory is to make any profit on the sale of its bagasse. The sale of all the bagasse means a complete modification of the boiler station—all boilers being oil fired. The abolition of the megass-fired boiler, with its difficulties of dropping steam pressures, &c., is a particularly good feature. The ease with which a new set of boilers can be brought in to cope with extra steam consumption at the evaporating station is one of the best features.

For the manufacture of the celotex, the megass has to be stored for some time—six to nine months at least—so that an incipient deterioration of the fibre can take place. This enables the subsequent treatment, compression, &c., to be more satisfactorily carried out.

Under present conditions, however, the megass on storage deteriorates to a much larger extent than is required. This is due to the action of micro-organisms and fungi which appear—more particularly in the wet material containing sacchrose material. The loss due to this deterioration has been estimated at 30 per cent., and so the Celotex Company are now engaged trying

13. Reports of Sugar Research Scholars—*continued.*

to combat this difficulty. Additions of fungicides, &c., to the megass before baling have been tried—the results are not yet apparent.

As a Queenslander I have the pleasure to state that this research work is being carried out by F. A. Irvine, a former student of the Applied Science School of the Queensland University.

Cinclare Factory.—This factory is perhaps the best equipped modern house in Louisiana. The unloading station is very elaborately laid out, consisting of an overhead travelling crane operated from an enclosed box near the head of the carrier. This electric crane unloads the cane from the large railway wagons on to a sloping platform with inlet conveyors which feed the cane into the carrier.

The milling installation consists of a low-set Fulton crusher of 34 inches by 84 inches, followed by a train of 34-inch by 84-inch mills, three in number. The intermediate carriers are of the enclosed Ewart type. All megass is baled for celotex, and consequently the entire boiler station is equipped for oil burning.

Lime is added continuously by the so-called "Petree-Dorr" patent—none other than the moveable hinge and three-way outlet for the milk of lime.

As previously mentioned, the Petree-Dorr process has been used at this factory but has now been discontinued—the process being now one of continuous Dorr settling with filter pressing of the muds.

The new Peck strainer installed for 1925 season proved too troublesome to keep clean and working, and was discarded. The factory is well equipped for evaporation, having one set of quadruple effêts and two sets of submerged tube-type triple effêts.

The boiling station is, moreover, well equipped with crystallisers.

The factory has an electric power equipment for operating the cane unloader, the fugals, the crystallisers, and a number of pumps.

In all respects the factory is well equipped and balanced; unfortunately, like all Louisiana houses, the difficulty of maintaining an adequate cane supply is acute—in 1924 the lost time for cane amounted to 33 per cent. of the total available time.

The capacity of the effêts, based upon the steam consumption and gallons of oil per ton of cane, is insufficient and accounts for the low quantity of maceration water used and the low density of the syrup. Towards the latter end of the season the juice was so poor that syrup manufacture was resorted to. Even then granulated sugar was added in the "blow ups" in order to improve the flavour of the syrup made.

In concluding this report of Louisiana conditions, I wish to record the assistance given to me by Dr. C. E. Coates, of the Audubon Sugar School.

N. BENNETT,

Travelling Technical Scholar.

During the past year Mr. Bennett spent considerable time in the engineering as well as the chemical side of the sugar industry. Until September he was engaged with the firm of Messrs. Mirrilees Watson and Company, Glasgow, Scotland. During the whole of his stay with that firm his work was essentially practical. In addition he visited some of the more important sugar engineering works in Glasgow and England. On leaving England he proceeded direct to the Louisiana State University at Baton Rouge, Louisiana, and attended classes in sugar chemistry and sugar engineering. On the opening of the sugar season he commenced his visits to the sugar houses and afterwards engaged on work at the University, and then went to the reserve refinery in Louisiana for refining experience.

Extract from report made by Mr. H. W. Kerr, Soils Scholar, September, 1926.

PORTO RICO.

Porto Rico, the fourth island of the West Indies in point of size, lies at the entrance to the Caribbean Sea. The southern plain receives, in parts, less than 25 inches of rain per annum, and as the land is devoted almost exclusively to sugar-cane, irrigation is essential to ensure a crop.

Sugar-cane has been cultivated in Porto Rico for upwards of 400 years; it was introduced by Columbus towards the close of the 15th century, and for many decades considerable quantities of sugar were exported to Spain. The land was naturally very fertile; most of the agricultural lands of the island possessed residual or alluvial soils after limestone, and though somewhat heavy in texture, they were abundantly supplied with plant foods. But continuous cropping for hundreds of years has resulted in the serious depletion of some of the best lands, and heavy applications of fertilisers are required to restore them to their state of virgin productiveness.

The sugar industry in Porto Rico has received a great stimulus during the past few years; and this came as the result of adverse conditions, which, striking almost simultaneously, threatened to wipe out sugar growing from the agriculture of the island. The first was the discovery of a serious epidemic of mosaic disease, followed closely by an outbreak of gummosis; sugar yields were thus seriously reduced, and the low prices obtained for their product since 1920 accentuated the already acute position. But the growers rose admirably to the occasion, and, from an agricultural point of view, at least, the industry now occupies a very sound position.

The method adopted was one of intensive cultivation, and this, coupled with a policy of rigorous scientific control, has enabled sugar-cane growing—the staple industry of the island—to be carried on successfully and profitably. These remarks apply primarily to the larger and more progressive estates of the country.

The general practice in preparing the land for the crop is to give the field two ploughings, followed by furrowing and planting. Ploughing is done both by machinery and animal traction; bulls are almost universally employed for the latter, but most of the large estates use Fowler steam ploughing outfits wherever practicable, and the results are excellent. Two definite planting seasons are observed; the "gran cultura," or fall planting, is done during September and October, and the cane is harvested at fourteen to eighteen months; the "primavera," or spring planting, is carried out during the harvesting

season, January to May, and the canes are twelve to fourteen months old when cut. Each system has its own advantages, and both are practised on all estates. In the spring time, top-seed is abundant as harvesting proceeds, but labour is in high demand. During the fall months, labour is more plentiful and cheaper, but body-seed must be used. The "gran cultura" crop gives the heavier yield, as is to be expected.

The canes are cut by means of a "machete," or long narrow knife, and hauling to the factory is done by the use of light railroad, bull carts, or motor trucks.

Ratooning is practised so far as it is practicable and profitable. On some of the more humid lands of the north coast, as many as twelve ratoons have been harvested; but this is quite exceptional, and in general, three ratoons are all that can be taken off. Certain estates on the south coast plant their fields every year, for they find this the most efficient means of mitigating borer and white grub injury.

In ratooning, the trash is drawn on to alternate hills, between the rows, and the free hill is ploughed by the use of a small bull-drawn plough, run along each side of the stools; fertiliser is applied in the furrow, and the trash drawn across from the other bank and buried; these latter banks then receive a similar treatment. Replanting is done at this stage, if necessary. Subsoiling on some of the heavier soils has proven an excellent ratooning practice.

It is interesting to note that the trash is never burned, and it has been observed that where accidental fire has destroyed the crop residues subsequent borer seems to be favoured.

Cultivation proceeds until the cane has covered in, and light cultivators, such as the Planet Junior, as well as hoes, are employed. Fertilisation is a universal practice on the large estates; a usual application is 600 lb. of a 12-6-3 mixture applied to the plant cane, and a somewhat lighter dressing to the ratoons; this is supplemented by 100 to 200 lb. of sulphate of ammonia on many fields, and this applies particularly to ratoons. It is fully realised in Porto Rico that for a successful sugar crop nitrogenous fertilisers are all important; for these tropical soils, subjected to high temperatures throughout the entire year, are rapidly depleted of their valuable humus and its attendant available nitrogen.

As has been stated, irrigation is practised wherever water is available.

In general, no records have been kept of the volume of water applied to the land, but their aim is to irrigate the fields twice each month, which means that probably 48 inches of water are applied during the season. The effect of even this moderate water supply, added to that received as rain, is evident when one considers that it is common to harvest a 60-ton crop at sixteen months; but adequate fertilisation is essential.

It is found that on most lands the growing and ploughing in of a leguminous crop—usually cowpeas or velvet beans—improves markedly the texture of the heavy soils, with a corresponding increase in the yields of succeeding sugar-cane crops. Filter-press cake is also much prized where it is available, and both the immediate and lasting effects of this soil ameliorator are well evidenced by the results obtained on a field of heavy alluvial soil in the south; an application of 25 tons of press cake, or "cachaza," per acre, was made five years ago, when the land was yielding a 17-ton crop of cane. The average crop since that time has exceeded 40 tons of cane per acre.

When mosaic disease was first discovered in Porto Rico some six years ago, the chief varieties grown were Crystallina and Cana Blanca (Otaheite). Both varieties suffered heavily, and the subsequent outbreak of gummosis in addition forced the growers to cast about them for a new variety to take the place of the old standards. Their choice fell first on Uba, and excellent cane yields signalised the introduction of this variety; but it had certain objectionable qualities. It was low in sucrose and purity, and high in fibre, the clinging trash rendered harvesting difficult and expensive, and it was often necessary to burn before cutting. So other varieties were imported, including P.O.J. 36 and other Javan varieties, which, though susceptible to these diseases, yielded a reasonable crop.

But the varieties which were to become the new standard canes were two which had been bred in Barbados by that grand old pioneer of cane-breeding, Dr. Bovell; I refer to B.H. 10 (12) and S.C. 12 (4). These varieties are admirably adapted to the conditions which obtain in many parts of Porto Rico, and some exceptionally heavy crops have been harvested. On certain estates B.H. 10 (12) constitutes over 50 per cent. of the entire plantings, and increasingly large areas are being devoted to its cultivation. Though both varieties are susceptible to mosaic, they are very resistant to gummosis, and, in addition, they yield a juice rich in sugar and of high purity.

Other varieties have also been tested, and B. 11569 and D. 433 find places on certain fields. D. 433 and S.C. 12 (4) have considerable drought resistance, while B.H. 10 (12) seems to require an abundant water supply, but the latter variety far exceeds the others in sucrose content.

The total sugar crop for the past season was about 600,000 tons, with an average yield of something over 20 tons of cane per acre.

British West Indies.

A chain of small islands, extending from Porto Rico to Trinidad, comprises the Windward and Leeward Islands. Many of these are British possessions, and they include the following:—St. Kitts, Nevis, Antigua, Montserrat, Dominica, St. Lucia, Barbados, St. Vincent, and Grenada. These, with the larger islands of Trinidad and Jamaica, constitute the British West Indies.

The islands are in general very mountainous, but the fertile valleys are intensively cultivated, and sugar-cane is an important crop. However, the acreage under cane on the smaller islands is necessarily limited by the area of the available agricultural lands.

The sugar produced on each island ranges from a few hundreds to 60,000 tons, the latter being the yield in Barbados during the past season. In certain parts the rainfall is a limiting factor, but the crops are very satisfactory, and with a reasonably wet year will average better than 20 tons of cane per acre.

13. Reports of Sugar Research Scholars—*continued.*

On *St. Kitts,* during the past season, 18,000 tons of sugar were manufactured. The soils there are fertile loams, and are very readily worked. They seem to respond only to nitrogenous fertilisers. The chief varieties grown are B.H. 10 (12) and S.C. 12 (4), and this statement applies for almost all of these islands.

Antigua has an almost level topography, and as a consequence the cane often suffers from an insufficient rainfall. The annual crop is somewhat less than that of St. Kitts.

Perhaps the most interesting of the group is *Barbados.* This is one of the oldest British colonies and the richest, agriculturally, of the smaller West Indian islands. It is only 160 square miles in area, yet it supports a population of 160,000—1,000 persons to the square mile. The island has the appearance of one large garden, for every available acre of land is under cultivation. Owing to the hilly nature of the country, the transportation of canes during harvesting presents quite a problem, so that almost every estate grinds its own crop in a small mill. At times upwards of 100 mills are employed in treating the crop, many of them being driven by wind power. There are, however, one or two mills whose capacity is in excess of 10,000 tons of sugar.

Something of a crop rotation system is practised here, cane being alternated with other food crops, such as potatoes and yams. A rather unique fertilising practice was observed; the cattle are penned at night in a small enclosure on the cane fields which are to be ploughed, and the compost of crop refuse and manure which accumulates is spread over the fields.

Barbados is, perhaps, best known in its relation to cane breeding. Dr. Bovell, who retired recently from the position of Director of Agriculture, after forty years of service, initiated cane seedling raising here at about the same time as the Javan workers adopted the practice. The work has been carried on continuously for over forty years now, and many valuable varieties have been produced.

The *Island of Trinidad* is much larger than any of the preceding, and it possesses many excellent agricultural lands. But sugar growing is of rather lesser importance as compared with cocoa and coffee production. Cane is grown on the western coast plain, and the annual crop is somewhat less than that of Barbados. The Imperial College of Tropical Agriculture was founded in Trinidad three years ago, for the purpose of promoting research in all branches of tropical agriculture, as well as training men for positions in administrative capacities on the agricultural estates. The sugar industry of the island does not occupy a high plane of development at present, but doubtless the efforts of the new institution will do much to improve its status.

Jamaica is the third largest island of the West Indies. Sugar-cane has been cultivated there almost since its discovery towards the end of the 15th century; but it cannot be said that the industry is in a sound condition. The crop for the past season was about 60,000 tons. The general practice is to make first sugars only, and to employ the molasses in the manufacture of rum.

Sugar cultivation has met with many reverses in recent years, and attempts have been made to employ improved agricultural methods for its production; but, unfortunately, the practices adopted were not sound economically, and the old, almost haphazard, methods are still used.

The island is extremely mountainous, and the area of cultivable land is but a small fraction of the total land surface. But there still remain considerable areas of excellent land, admirably suited for cane cultivation, but, unfortunately, they are located on the leeward side of the island where the rainfall is scanty, and a supply of water adequate for irrigation purposes is not as yet available.

Uba proved a very valuable variety here, when in 1920 the standard variety, Crystallina, was seriously affected by mosaic; it gives very good yields, but harvesting and milling difficulties are experienced, as in Porto Rico. The low purity of the juice is not, however, objectionable when it is used in rum manufacture.

Mr. Kerr is at present studying at the Soils Department of the University of Wisconsin, United States of America.

Extract from report of Mr. A. F. Bell, Pathological Scholar.

On 12th January of last year Mr. Bell entered the University of California as a graduate student and attended courses in plant nutrition, plant citology, advanced plant pathology, and a seminar course in advanced plant pathology. During the summer vacation Mr. Bell visited Louisiana, Florida, and Cuba. Mr. Bell's notes in this connection appeared in last year's report. This year Mr. Bell visited Porto Rico and the West Indies.

Mr. Bell states—

"At Porto Rico I was met by Dr. Mel T. Cook, Pathologist to the Insular Experiment Station, and to this gentleman are due my deepest thanks. Owing to his courtesy I was enabled to get an excellent idea of the conditions prevailing. This island is fortunate in having two experiment stations, the one at Rio Piedras, maintained by the Insular Government, and the other on the west coast at Mayaguez, maintained by the United States Federal Government. Both of these are intended for general purposes and not for sugar experiment stations exclusively; each maintains a pathological laboratory. At present a good deal of seedling raising is being carried on at Mayaguez, and I was interested in seeing the work of Mr. R. L. Davis in this respect. In Porto Rico the bulk of the cane is grown on fairly large estates, which are managed by Americans or by Porto Ricans who have been educated in the United States. The small farmers, or "colonos," are numerous, and, as is to be expected, they do not practice a scientific type of agriculture. On the estates, however, the management is keen, and the standards would not suffer by comparison with any other country. Some of these estates have private experiment stations, use artificial fertilisers, and maintain good yields of cane. It is quite common to see large tracts which yield over 5 tons of sugar to the acre, the cane being sixteen months old at the time of ratooning. Long

13. Reports of Sugar Research Scholars—*continued.*

ratooning is not practised, three being the maximum. A number of localities do not ratoon at all. The standard canes are B.H. 10 (12) and S.C. 12 (4), both Barbados seedlings, and both admirably adapted to Porto Rican conditions. The industry in Porto Rico was threatened by the ravages of mosaic, but this disease is now completely under control on practically all the estates. This was brought about in the first instance by the elimination of the highly susceptible varieties and the establishment of healthy seed beds. Thereafter it has been the practice to continue seed selection and roguing. Two plantations which are now free from the disease started their campaign on eradication with an infection of 90 per cent.

"Of great interest to me was the Porto Rican gumming disease, as I was anxious to see how closely it resembled our own. As far as the symptoms go it would appear that the two are identical; however, it would be interesting to have a conclusive test. With this object in view I am endeavouring to have Dr. Cook and Mr. North send samples of the organisms to California, where their identity or not can be determined by serological methods. Of greater interest was the fact that the plantation men do not consider it to be a very important disease in that they consider it easily controlled by the use of resistant varieties. Moreover, judging from reports, the main source of spread seems to be the cane knife and not an insect or insects. The list of canes considered to be highly resistant is quite an imposing array, and in particular the two standard canes, B.H. 10 (12) and S.C. 12 (4), are very resistant. In view of the superior quality of these canes, and in particular in view of their resistance to gummosis, I think it highly desirable that we get a supply of them.

"The other more important diseases in Porto Rico are eyespot, caused by *Helminthosporium sacchari*, and the dry top rot, caused by *Plasmodiophora vascularum*, root rot in certain localities, and also considerable damage by the borer, both by the moth and the white grub.

"From Porto Rico I crossed to the island of St. Thomas, by motor boat, and there boarded a steamer southward. On the way to Trinidad I visited several of the West Indian Islands, and in particular St. Kitts, Antigua, and Barbados, spending three days on the latter island. At St. Kitts I visited Mr. F. R. Shepherd, the Superintendent of the Experimental Station, and was shown round the island by him. St. Kitts was unfortunate enough to import gummosis, which is very severe on the B. 6032, but as B.H. 10 (12) supplies most of the crop the disease causes no alarm. Mosaic made its appearance but seemingly has been entirely eradicated from the island; all the cane is grown on the plantation system and so it was comparatively easy to put into operation a plan of intensive roguing. Antigua and Barbados are free from gumming and have similarly eradicated the mosaic. Antigua is the seat of government for the Leeward Islands, and while there we were taken care of by Mr. A. E. Collens, the Director of Agriculture for the Leeward Islands. Barbados was very interesting as the home of so many well-known seedlings, and, with Java, the birth-place of seedling cane raising. The raising of seedlings is still the chief work of the experimental station, which is now starting a new system of numbering. One of the problems which is being attacked is that of speeding up the methods of selecting the desirable seedlings.

"Owing to the boat arriving late at Trinidad, I was forced to spend only one day there instead of five, as had been planned. Consequently, I could not do much more than call on Dr. Leake, the Director of the College of Tropical Agriculture. The conditions appear very similar to those in the other islands, with the exception that they are much troubled by the froghopper.

"From here I took a ship to Jamaica, spending a day at the Canal and two in Costa Rica. I was very disappointed at the standard of agriculture in Jamaica, it being of a very primitive type. There is an experimental station in Kingston, but beyond a certain amount of breeding there is not much experimentation with cane. A few years ago the sugar industry was in a very bad way owing to the inroads of mosaic, and Uba was introduced to relieve the situation. This cane now constitutes the greater part of the crop, but it will probably be replaced by B.H. 10 (12). By far the most valued part of the visit to Jamaica was the privilege of meeting Mr. J. R. Bovell, for forty years the Director of the Barbados Experimental Station, and now retired. A pioneer in seedling raising, Mr. Bovell has a remarkably wide range of knowledge and a very fine grasp of the trend of modern scientific agriculture.

"I am preparing a résumé of the disease situation in the United States and the West Indies, and shall complete it in England and forward it on for your information."

Mr. Bell is now in England at the Imperial College of Science, University of London, completing his pathological course.

14.—ECONOMICS OF THE INDUSTRY.

Sugar-growing has made wonderful progress in the last few years, and the record production of sugar in Queensland took place last year when 485,585 tons of raw sugar of 94 net titre were produced. The climatic conditions were, on the whole, favourable, but the large increase in the number of cane-growers and in the area cultivated and crushed was mainly responsible for so large a crop. The yield of sugar-cane was 3,668,252 tons. Many of the Northern mills did not conclude operations till January and February of this year.

As pointed out, the total area under cane has considerably increased in recent years. The number of acres cultivated last year was 269,509, of which the cane from 189,466 acres was crushed. The average acreage to each planter was 35 acres. The number of plantations of 5 acres and over are given by the Registrar-General as 6,730, while the number of plantations under 5 acres was 909. The average acreage to each planter is as follows:—Cairns to Townsville, 48; Townsville to Mackay, 43; Bundaberg, Childers, Maryborough, &c., 26; Logan and